

Z.
TWEEDDALE
S.32

166. Borneo Birds
176. - - - - -
240. Bp's Suff. Mono. Ind. Malayan Cuculidae
301. Hodson Cat of Japanese Birds - present &
new. As. Savt & Bengal.
447. Addition to Cat. Japanese Birds, Hodson.

JOURNAL
OF THE
ASIATIC SOCIETY

OF

BENGAL.



THE SECRETARY AND SUB-SECRETARY.

VOL. XII.

PART I.—JANUARY TO JUNE, 1843.

NEW SERIES.

"It will flourish, if naturalists, chemists, antiquaries, philologists, and men of science, in different parts of *Asia* will commit their observations to writing, and send them to the Asiatic Society, in Calcutta; it will languish, if such communications shall be long intermitted; and will die away if they shall entirely cease."—SIR WM. JONES.

CALCUTTA :

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1843.

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NOTICE.

A mistaken impression having gone abroad respecting the high rate of subscription said to be required from Members of the Asiatic Society of Bengal, the Committee of Papers desire specially to note that the total subscription entitling a Member to all the usual privileges as hereinafter noted, is *sixty-four rupees a year, or five rupees five annas a month.*

Rules of the Asiatic Society.

The following is an abstract of the Rules of this Institution which are now in force, including those printed in the Appendix to the sixth and subsequent Volumes of the Society's Transactions.

Original Rules adopted from the Founder's Discourse 15th February, 1784.

1.—The Institution shall be denominated the Asiatic Society, the bounds of its investigations will be the Geographical limits of Asia, and within these limits its enquiries will be extended to whatever is performed by man or produced by nature.

2.—Weekly meetings shall be held for the purpose of hearing Original Papers read on such subjects as fall within the circle of the Society's enquiries.

3.—All curious and learned men shall be invited to send their Tracts to the Secretary, for which they shall immediately receive the thanks of the Society.

4.—The Society's Researches shall be published Annually, if a sufficiency of valuable materials be received.

5.—Mere Translations of considerable length shall not be admitted except of such unpublished Essays or Treatises as may be transmitted to the Society by Native Authors.

6.—All questions shall be decided on a Ballot, by a majority of two-thirds, and nine Members shall be required to constitute a Board for such decisions.

7.—No new member shall be admitted who has not expressed a voluntary desire to become so, and in that case no other qualification shall be required than a love of knowledge, and a zeal for the promotion of it.

Subsequent Resolutions of the Society which are in force.

8.—The future meetings of the Society shall be held on the first Wednesday of each alternate month, viz. in the months of February, April, June, August, October, and December, at nine o'clock in the Evening.

9.—If any business should occur to require intermediate meetings they may be convened by the President, who may also, when necessary, appoint any other day of the week, instead of Wednesday for the stated meetings of the Society.

10.—As it may not always be convenient for the President, to attend the meetings of the Society, a certain Number of Vice Presidents shall be elected annually.

11.—In case the President and the Vice Presidents are absent at any meeting, a quarter of an hour after the fixed time, the Senior Member present shall take the chair for the Evening.

12.—Every Member of the Society shall have the privilege of introducing as a Visitor, any Gentleman, who is not usually resident in Calcutta.

13.—With a view to provide Funds for the necessary expences of the Society, an admission Fee shall be established to consist of Two Gold Mohurs, payable by every member on his Election; and each member of the Society resident in India (Honorary Members excepted) shall also contribute a Gold Mohur quarterly in the first week of January, April, July, and October, any member neglecting to pay his Subscription for half a year, after it becomes due, to be considered as no longer a Member of the Society.

14.—All Members returning to India, shall be called upon to pay their Subscription as usual from the date of their return.

15.—A Treasurer shall be appointed.

16.—In addition to the Secretary, an Assistant Secretary, and a Librarian shall also be appointed.

17.—A Committee of Papers shall be appointed, to consist of the President, Vice Presidents, Secretary, and nine other Members to be elected annually, and any number no less than five shall be competent to form a Committee.

18.—This Committee will select from the Papers communicated to the Society such as may appear proper for publication, and superintend the Printing of the Society's Transactions.

19.—The Committee of Papers shall be authorized to draw upon the Treasurer for any sums requisite to defray the expense of publishing the Transactions, and an order signed by a majority of the Committee, will be a sufficient warrant to the Treasurer for paying the same.

20.—The Committee of Papers is authorized to defray any small contingent expenses on account of the Society, which they may deem indispensable.

21.—Every Subscribing Member of the Society, on application shall be furnished with a Copy of such Volumes of the Researches as may be published whilst he continues a Member in return for his contributions, without any further payment.

22.—With a view to the more general circulation of the Asiatic Researches in India, the price of the 12th and future Volumes to Non-Subscribers, shall be fixed at a Gold Mohur, and if several Volumes of different years be purchased together they shall be sold at 10 Rupees each.

23.—The Agents of the Society in England shall be desired to purchase, and forward for the Society's Library, Books of Science and Oriental Literature published in Europe, taking care that those purchases at no time exceed the Funds arising from the sale of the Society's publications.

24.—The Committee of Papers shall be requested to furnish the Agents in Europe with such further instructions as may appear requisite for their guidance in the selection of Books proper to be placed in the Library of the Society.

Library.

25.—The Library is open from 10 to 4 o'clock, between which hours the Native Librarian is to be in attendance every day, Sunday excepted.

26.—None but the members of the Society are allowed to borrow Books from the Society's Library and no Book is to be lent out of Calcutta, without especial permission from the Committee of Papers.

27.—Books are to be borrowed by written or personal application to the Secretary; in either case the person applying is to furnish a written receipt specifying the name of the Work, and the time for which it is borrowed, at the expiration of which, he is to return the Book borrowed, or renew his application for an extended loan of it.

28.—The receipts for the Books shall be filed and a record kept of the Books lent out to whom and when lent out, and when returned.

29.—A list of the Books in the library, and a Register of those lent out, are to be kept ready for inspection.

30.—All persons borrowing Books, are to be answerable for their safe return, or are expected to replace them if injured or lost.

Museum.

31.—On the 2nd February 1814, the Society determined upon forming a Museum for the reception of all articles that may tend to illustrate Oriental manners and History, or to elucidate the particulars of nature or art in the East. The following Resolutions were at the same time passed upon the subject.

32.—That this intention be made known to the Public, and that contributions be solicited of the undermentioned nature.

1. Inscriptions on Stone and Brass.
2. Ancient monuments, Mahomedan or Hindoo.
3. Figures of the Hindoo Deities.
4. Ancient Coins.
5. Ancient Manuscripts.
6. Instruments of war peculiar to the East.
7. Instruments of Music.
8. The vessels employed in Religious Ceremonies.
9. Implements of Native Art and Manufacture, &c. &c.
10. Animals peculiar to India, dried or preserved.
11. Skeletons or particular bones of Animals peculiar to India.
12. Birds peculiar to India stuffed or preserved.
13. Dried Plants, Fruits, &c.
14. Mineral or Vegetable Preparations in Eastern Pharmacy.
15. Ores of Metals.
16. Native Alloys of Metal.
17. Minerals of every description, &c. &c. &c.,

33.—That the Hall on the ground floor of the Society's House be fitted up for the reception of the articles that may be procured. The Plan and expenses of so doing to be regulated by the Committee of Papers and Secretary, and the person under whose superintendence the Museum may be placed.

34.—That the expense which may be incurred in preparing materials furnished in a state unfit for preservation be defrayed by the Society within a certain and fixed extent.

35.—All articles presented to the Museum shall be delivered in the first instance to the Superintendent of the Museum, to enable him to make the acknowledgement directed in the standing rules of the Society.

36.—A Register of Donations to the Museum, shall be exhibited at each Meeting of the Society.

37.—The Committee of Papers shall adopt such means as may appear proper for making the intentions of the Society, in this respect, generally known.

38.—That the names of persons contributing to the Museum or Library of the Society, be hereafter published, at the end of each Volume of the Asiatic Researches.

Bibliotheca Asiatica.

The following Resolutions were passed on the recommendation of the Committee of Papers, under date the 2nd July 1806, but materials have not yet been received for publishing a Volume of the work therein proposed.

39.—That the Society publish from time to time as their Funds will admit of it, Volumes distinct from the Asiatic Researches, translations of short works in the Sanscrit and other Asiatic Languages, or Extracts and descriptive accounts of Books of greater length in those Languages, which may be offered to the Society, and appear deserving of publication.

English.	Dialect of Sar.	Dialect of Lar.	English.	Dialect of Sar.	Dialect of Lar.	English.	Dialect of Sar.	Dialect of Lar.
Abandon, to	chha diyan	choran.	Account	lekho, hisab	khando.	Along, with	gad, san	
Abandoned	sunco [jan	sung.	Accuse, to	daira bandhan		Allowance	seedho, wiran	
Abase, to	martabocaehee wi-		Accusation	gila.f. pachar, m.		Already	hane	
Abate, to	khutan		Acid	khatto		Also	whee	nit.
Abhorrence	ghat karan }	ghin.	Acquainted, to be	sunyanan	mahit thiyar.	Always	sada	dhun.f.
Ability	kirb }		Across	hoona bhar		Among	wich, men	
Able, to be	sagh }		Action	halat kam	adr, par.	And	oun, biyo	
Abode	was }		Active	bhar	janjro.	Angry	damar, kawar	
Abolish, to	saghan		Accustom, to	heran		Another	biyo	
Abortion	tikans		Add, to	nibahan	chahontan.	Answer	warancee, jawab	
About	badhkaran		Adhere, to	jumlo karan	j'in.	Ant	makoro, udae	
Above	bharkiran	khanhar.	Adept	ustad		Any	jeko	soyiro.
Abroad	chondares }		Adjoin, to	gadd thiyar		Antimony	surma	
Abscess	te		Adultery	fach, char		Arm	banh	
Absence	mathe		Adult	baligh		Army	laskhar, katak	
Abstemious	bahar		Advice	zina	mat.f.	Arrogance	banh	bhan, m.
Absurd	pohree	kiro.	Afoot	gantee, salah	ach, han.	Arch	jaro	
Abundant	na, achan	wej.	Adfraid	salah diyan		Appear, to	sarah	jas.
Abuse	satewan		After	perin, piyado		Architect	sujan	
Abutilion	pahrez		Afternoon	drijuan	aggin.	Arrange, to	od, rajho	
Accept	beja galh		Again	poiary		Arrangement	sudharan, thahan	
Accident	ghano		Age	poimoti, waree		Aligator	sola	rith.
Accivity	gar		Agreement	jamar wahi		Almond	wago	
Accompany, to	maso		Ague	whaiwaree	laman.	Apple	badam	
Accomplice	sakaran		Aid, to	waido	siyo.	Aprerient	julab	
Accord, with one	manyar		Air	thadd		Arrive, to	ponchan	rasan.
	ochto		All	hath rakhari		Arrow	kan, teer	gag.
	charee		Alone	wa		Armpit	kach, h	
	gadjee halan		Alike	sabhe mite		As	jiyen	ch, hayi.
	hamrahee		Alimony	heklo		Ashes	rakh	ch, hayi.
	gadjee			h'ho, jero		Apprize, to	chitayan	janaya.
				daj		Assaetida	hing	

English.	Dialect of Sar.	Dialect of Lar.	English.	Dialect of Sar.	Dialect of Lar.	English.	Dialect of Sar.	Dialect of Lar.
Ask, to	puchhan, goran		Bale	bhujko	gandre.	Beard	daree	sunlauree.
Asleep	sumeo, suto		Ball	goree		Bearer	kahar	
Ass	gadho, koten		Bamboo	bans		Beast	miru [chango	
Assistance	madad, wah		Ballot or Sub- scription	p ukha, pattee	{ dharo, chando.	Best	change khon	sutro.
Assembly	majlis		Bamboozle, to	ghusayan		Beautiful	sohno	
At leisure	palu		Bandage	pattee paho		Because	hinakare [wan	
Attendant	khashkailee		Baneful	wih		Become, to	thiyan, thi pa-	
Awake	jago		Banyan	wanyo		Bed	hand, sejband	
Aware, to be	chetan		Banish, to	pardes karan		Bee	makhee, jindan	
Avarice	loth		Bank	bhar, kandee		Beef	gaomah	
Away	jufo. [piyo.		Bankrupt	dewalo		Beetle nut	japhar	
Away with him	ghorio, khar- hayo.		Bar	dak		Bazar	bazaar	[naro.
			Barber	hajam, naee		Before	age, agle	penar maug-
Aunt, far	pari, agahun		Bare	uqharo, oojar		Beggar	lango	
Aunt, maternal	masee, mamee		Bargain	hod, shart	oojar.	Begin, to	lagan	
Aunt, paternal	phuphee, chachee		Bark	chhodo		Behind	puthiyan, poite	
Abstain, to	wat rakhan		Barley	jau		Belch	ogarayee [han	
Ankle	murru, goro		Barren	kabraten	pachhar.	Believe, to	munyan, wisa-	
Area	angan		Base	kameeno	pajee.	Bell	ghand, ghinru,	
Babe	bar, balak		Bashful	sharmindo		Bellow, to	ramban kuran	
Back	puh	gabhur.	Basket	kharee, chhabo		Bellows	dawan	
Backwards	puthiyan		Bason	chilamchee	dallo.	Belly	peth	
Bad	buch, hro		Bastard	haramjado		Beloved	pirin	hot.
Baffle, to	namumed karan		Bathe, to	wenjhan	shuan karan.	Below	heth	
Bag	gothree, boro	khiso.	Bat	chamro		Beneficence	bhalayee	
Bag for horses	tobro		Bead	dano		Beneficent	subago	[chango
Baggage	madee	walla.	Beak	chumbh	[ran.	Benevolence	change khon	het.
Bail	jamin		Bend, to	nurayan		Best	hod	
Bait, to	atto layan		Be, to	thujan, huwan		Bet	pare	
Bajree	bajar	[karee.	Beam	shahter.	kam.	Beyond	rowan	
Balance	tarazu, kanto	simee, tra-	Beam	matar		Beware, to	khabar'dar	
Balcony	baithak.		Bear	rich, h (to bear)		Bible	sufio, pitto	sawon pancee.
Bald	gaujo		Bear, to (a child)	wiyaman		Bill	hundee	tip.

English.	Dialect of Sar.	Dialect of Lar.	English.	Dialect of Sar.	Dialect of Lar.	English.	Dialect of Sar.	Dialect of Lar.
Bray, to	hingān		Cat	billee	pusee.	Chiefship		jamani.
Breadth of a cloth	bhar		Catch, to	jalan, watan		Child	bar, ningar	
Cackle, to	bang diyān		Cattle	pahrin, dor		Chin	khadee	thodee.
Cage	pinjro		Cause	karan		Chintz	cheet	gur.
Cake	laddu		Cautery	dambh		Choice	wanat, rij	
Calamity	bala	jaza.	Caution	sambhar		Choose, to	guran	
Calf	wachh		Cavern	chur	darō.	Churn, to	wiloran	
Caldron	kunno		Cavity	ghabo, ber	girkhee.	Cinnamon	dalcheenee	
Call, to	sadan, kotan		Cease, to	chhadriyan		Circumcise, to	toharayan	
Calling	kast, hunr	nado.	Ceremony	reet, melo		Circumcision	tohar	
Camel	uit (neeklace,)	lero, boro.	Certain	dilsan layee,		Circuit	gher	kundree.
Camphire	kapur		Chaff	toh		City	nagai, shahr	dero.
Candle	diyo		Chain	nel		Claim	dawo	janjal.
Candlestick	diyatee		Chair	manjee	gadel.	Clay	garo	
Cane, sugar	kamand, kanu	lakkur.	Chalk	met	acheemittee.	Clean	ach, ho, nirmal	phutro.
Cap	topee		Chamber	koto		Clean, to	ch, haran	
Capital city	takht		Change	ochto		Clear	chito	lasso.
Caravan	cafla, saltee		Change, to	matan		Climb, to	charhan	
Card to cotton	pinyan		Channel	wah		Clip, to	kataran	munghan.
Carder of cotton	pinyarō		Charcoal (on fire)	angar, (not on fire) kotla		Cloak	labado	
Captive	bandewan		Charge, to	suparish karan		Clock	gharee	
Care	khahardare		Charm	mantr (of snakes)		Clod	bhitār	
Careful	samjarwaro		Chaste	mantr		Clothes	kapra	latta.
Cardamoms	phonts		Cheap	pak, sutr	sukkhar.	Cloth	waggo, gandee	
Carpenter	wadhō, drakano		Cheapness	sahngo	kasrato.	Cloud	kakkar	
Carriet	gilim,		Cheat	sahngae	moree.	Cloudiness	jur	ghin.
Carrot	dhoond, murdo		Check	makrel, teelalee		Glove	laung	
Carry, to	niyan		Check	gilito		Cloyed, to be	drapan	kurtee.
Cart	gajur		Chew	churan		Club	giddee	dhuko.
Case	gadee		Chew to	chaban		Cock	ghobtee, lath	
Cash	gotree, posh		Chew to (the end)	ogaran		Coffee	kukkur	
Cataplasn	rok, tako		Chief	kukurjo bacho	kulran.	Cold (a cold)	kaho	
	lupree			sirkardo, wadero			(les) thaddo	

English.	Dialect of Sar.	Dialect of Lar.	English.	Dialect of Sar.	Dialect of Lar.	English.	Dialect of Sar.	Dialect of Lar.
Cluster of grapes	chugo, (of dates) goshu		Covetous	lobhee		Cut	chuto	
Color	rang	waran.	Cow	gaun	khadro.	Cubit	hath	
Comb	phanee		Crack	dujanwaro		Cucumber	badrang	
Come, to	achan, rason	rasan.	Craft	pingo		Conceited, to be	likan	
Companion	sathee	sangtee.	Craft	kasb	kirt.	Cup of brass or metal		piyallo.
Complain	danh		Cramp	wakar		Curdled milk	katoro, watto	
Complete	puro		Create, to	thar	kunj.	Curtain of a bride	mohro	
Compliments	salam		Creator	khalkan		Dagger	katee	
Consent, to	mauyan	basan.	Credit	khaik		Daily	dinhu-dinh	
Conversation	galhayyan	charcho.	Creek	nang		Dance, to	naehan	
Consideration	wihar		Creep, to	khadee		Dancing girl	kanjaree	
Company at a marriage	jhanj		Cross	petabhar wanyan		Damp	alo	
Counterfeit	wes (m)	muddo.	Cross	banuee, baree		Dare, to	taufik thiyan	
Contract	waido	joran.	Crow	tikko, tund		Dash, to	oochilian	
Cook, to	randan		Crowd	kaw		Dark	andharo, oondaee	
Copper	tramon		Cruel	dado, berahm	katar.	Daub, to	meran	
Coppersmith	thantharo		Crumb	bhor		Date of month	mittee	
Copulate, to	jahan		Crumble, to	bhoran		Date (fruit)	kark (tree) katal	
Copy	utaro	siddo, kharo	Crush, to	mahtan		Daughter	dhee, niyanee	
Correct	theek	marh.	Cry, to	kukan	ruan. [bro.	Daughter-in-law	soh	
Corpse	murdo	bhungo.	Cry	kuk	hakal,	Daughter, grand	dhaitree	pirat.
Cottage	landee		Cumin	wudf, roomee		Day	pirbhat, asur	
Cotton	kapah		Cultivate, to	pokhan		Day	dinh, pareen,	
Cotton spinner	koree		Cultivation	pokh		Dead	chamkando	parchaeen.
Cover	dhakan	ralee, sawar	Curled	dudh, dhoro		Deaf	muwo	
Cover, to	dhakan	butan.	Cushion	gaddee	bhundo.	Dear in price	boro	
Cough, to	khangan		Course	parato		Dear, beloved	mahango	
Count, to	ganan	lekhan.	Custom	dastoor, parwez		Debt	pirin, p, yaree	supurin.
Country	bhun	deh.	Cure	chhuto		Debt	udharo, karz	
Court	kacharee	dankhano.	Curl	choona, lona		Deceit	karzee	
Courage	sautr	hiwan.	Current	seer		Deceit	makar, fareb	ghat, dhoko.
Cousin	sautr		Curious	sukree		Deceive, to	droh dewan	
Covenant	koul		Cut, to	wadan, kapan				

English.	Dialect of Sar.	Dialect of Lar.	English.	Dialect of Sar.	Dialect of Lar.	English.	Dialect of Sar.	Dialect of Lar.
Decision	nibero		Distribute, to	wirahan		Early		
Decay, to	winyayan		Dishonor	bramane	karayee.	Ear	sawe, dhakee	pirbhatee.
Defeat	bhajan		Dress of honor	pahrayan		Earring	boandro, bilero,	lurko.
Defeat, to	bhajayan		Drink, to	piyan		Earth	mittee	
Defile	soree wat	lakk.	District	pargano		East	obar	obrando.
Deer	haran, kotapacha		Distance	dur, pand	wecho.	Easy	saukho	sahaujo, su-
Den	ghar, belo		Dive, to	tubbee diyan		Ebb and flow	war charhanoun	[kho.
Dense	gatto		Diversion	rand	guman.	Eddy	lahan	
Derision	thaththo	charcho.	Ditch	khahre		Edge	kun	
Deep	tar		Drum	dhul		Egg	mouh	
Delay	chirk	awel, gisar.	Drunk	mast		Egg ano	ano	
Depart, to	ladan	usaa, ladan.	Do, to	karan		Eight	ath	
Devil	shaitan	daat.	Doctor	tabeeb, waid	waid.	Elbow	irk	thunth.
Devout	khudaje watatesan		Dog	kutto		Elk	goin	
Deny, to	mukran	'alan.	Doubt	ma, mata		Elephant	fathee	
Dew	matr	mak.	Door	darwajo	dar.	Embezzle, to	khaee wanyan	
Due	puro		Double	bino	bitto.	Empty	sakhoo	thallo.
Decrease, to	ghatan		Drop	tepo, churako	chhando.	Embrace	bhakur	
Devote, to	ghoran		Drop, to	triman	chuwan.	End	matho	siro, ant.
Deficient	kasu, gat		Dry	sukho		Envy	rishk	
Definite	nistunk		Dyer	khatree		Enter, to	paihan	ghiran.
Deserted	sunyo		Dye, to (the beard)	keslayan (cloth)		Enemy	were	
Detail	wichur, wigit		Doze, to	rangayan		Enchantment	jhar, kaman	
Die, to	maran		Draw, to	cjhrakee thiyen	ojhran.	Enough	ghano, bas	jajo.
Difference	pher		Dough	chikan	gilan.	Enquire, to	golan	
Difficult	aukho	aulo, kathhan	Dung (of a horse)	atto, goto		Epilepsy	maree	
Dig, to	khotran		Dung (of a cow)	lid (of a cow)		Entrails	ojree	
Dirt	gap, mittee			chheynu		Emerald	panno	
Direct, to	sinamo	dasan.	Dewlap	phipher		Eradicate	patan	upatan.
Direction	nakhoosh fhiyan	rugan.	(Dalbergia sisu)			Erase, to	khotran	
Disgusted, to be	dhanaku, thalee		or sheesham tree*	talee	sinjee.	Estimate, to	kathan	
Dish	lahan		Each	hekro		Evening	saujee	
Dismount, to	chabh	mhat.	Eagle	ukab		Ever	kadhin	hadd.
Distress						Every	jeko	

* The Sissor, — *Ed.*

English.	Dialect of Sar.	Dialect of Lar.	English.	Dialect of Sar.	Dialect of Lar.	English.	Dialect of Sar.	Dialect of Lar.
Evidence	shahid		Farm	pokh	kbet.	First	pehro	
Examine, to	parkhan		Farmer	rahak		First	muk	
Exchange, to	matn		Fast (swift)	takro, rogo (ceasing from food)		Fire, to set	bandukhanan	
Excuse	bahano, gusayan		Fastening	silar	[ro. mata-]	Fireplace	bah diyān	
Exceed, to	wadan		Fat	thullo	matto, mata-	Firey	chul	
Exchange, in	para	paran.	Fatness	charbee	wah.	Fish	trund	
Exercise	dand, istimal	dakh, hro. dhāran.	Fatal	halakee		Fish, kind of	pallo, dambro	
Except	warācee		Fate	kismat		Fit, to	laik	thahan.
Exhaust, to	khalee karan		Father	babo, piya		Fit	saon	
Expense	kh, harch		Father-in-law	sohro		Flat	khushamad	
Extinguish, to	ujaman	wisahan.	Father, grand	nano, dado	chuk.	Flattery	wayee	
Ewe	gheteee, dumbee		Fault	doh, bhul		Flatulent	mung	wan.
Eunuch	hijro	khojo.	Fault, to	hakka paran	dap.	Flax	moongan	
Eye	ak		Fear	drij, bhau		Flea, to	bhajhan	
Eyebrow	bhirun		Fear, to	langan		Fleece	bhendejee khal	
Eyelash	pimbree		Ferry	kuwatwaree		Flesh	gosht	mah.
Eyeball	wanee	taro.	Fertile	kh, hambh		Flexible	kuaree	
Equal	surto, fedo		Father	kharyan	rijh.	Flay, to	khal layan	
Expended, to be	khajan		Feed, to	khushhee		Flint	pahnee	
Evening prayers	somanee		Felcity	madee		Float, to	tarān	
Earring	panro		Female	gando	kinno.	Flock	dhan	
Ear of corn	sang		Fetid	sap	baro.	Floor	ch, hat	
Face	munh		Fever	anjeer		Flour	atto	
Fade, to	kumano thiyān		Fig	ucho	net.	Flow, to	wahan	
Fail, to	moradakhe na		Fine	akhir	[ran]	Fortunate	bhag bhareo	
Faint	ponchan		Finally	niberan	chukan, su-	Flower	gul, phool	
False	hino, besudh	jutho.	Finished, to be	jhero, jaug		Foam	gajee, gaf	gag.
Fallow	kur		Fight	wiran		Fold, to	wiran	
Family	wisane		Fight, to	bharan	[payan]	Food	khayan, khaj	
Famine	kurm	kutum.	Fill, to	milan, labhan	ladan, pir-	Formerly	agato, aguno	
Faith	dukāl	kal, awasar	Find, to	angur		Fly	makh	
Far	bawar, deen		Finger	purō karan	jando, jero.	Fly, to	udaman	
Farmer	pare, agahun		Finish, to	bah		Forged	khotee	
	nalband		Fire					

English.	Dialect of Lar.	English.	Dialect of Sar.	Dialect of Lar.	English.	Dialect of Sar.	Dialect of Lar.
Fool	perandee.	Grandfather	dado, nano		Green	sawon, sai	
Foot	rokan.	Grandmother	dadee, nanee		Greens	sag	
Foot of bed		Grandson	dhoitr		Grief	dukh	gundar.
Forbid, to		Granddaughter	dhoitree		Grind, to	pihan	
Force		Gratis	mufit		Grinding mill	janthro	
Foundation		Grateful	mamnun		Groom	sais	
Fragrant		Ginger	patko	boch, han.	Grow, to	utharan	ustran.
Free	niweklo.	Girdle	tang		Grocer	pansarre	
Fresh	tatto.	Girth	diyan	nihal.	Gruel	rib, bhat	rab.
Frown	mair.	Give, to	shuro	kach.	Guana	goh, kirdee	
Friend		Glad	shisho, ahree		Groin	naro	
Fruit		Glassware	dastano		Groan	sas	
Fuel	karnee.	Glove	tapan		Gain	nafo	khatteo.
For	parawo.	Glow, to	wanyan, halan	usan.	Guard	choukee	
Foreign	nirar.	Go, to	chhelo, bakree		Guglet	dullo	dillee.
Forehead	bhullan.	Goat	dhane, allah		Gun	dambuk top	banduck.
Forget, to		God	son		darun	barut	barut
Forgive, to		Gold	chango, mocharo		Gunpowder	suhim	satee agwan.
Fort	kot.	Good	changayee		Guide	atkal	
Fortune		Goodness	dano, ann	kana.	Guess	mehman	
Fowl		Grain	lase, saras, kham-	gond, beer.	Guest	rambha karan	
Fox		Glittering	sonaro		Grun, to	her	
Fraud		Glue	rat san bharro		Habit	war, chotee	jhonto.
Fraud		Goldsmith	bhando		Hair	adh	[thonkan.
Frighten, to		Gory	chano		Half	to hammer,	
Fringe		Granary	drakh	dakh.	Hammer	hathearee	
Fry, to		Gram	tumbo		Hand	hath, chambu	kar.
Full		Grape	grah		Handful	muth	lap.
Footsteps		Gourd	hadiro, bhuttee	masan.	Handle of sword	kardiyo	
Flag		Grass	charan charan, v. a.		Handle of door	sobno	karo.
Gambling		Grave	waddo		Handsome	sutro.	
Garden		Graze, to, v. n.	sanbh		Hang to, by the neck	phaho diyan	
Gardener		Great			Hang up, to	tangan	
Garlic		Greasiness					

English.	Dialect of Sar.	Dialect of Lar.	English.	Dialect of Sar.	Dialect of Lar.	English.	Dialect of Sar.	Dialect of Lar.
Jaw	keyaree		Labourer	pohriyo, mehnat		Lemon	limun	
Jawaree stalk,	kuttar		Lad	mazoor	lasiyar.	Lend, to	udharo dewan	
chopped for cattle	jarwan		Ladder	lasut	pawnree.	Length	wekran	
Jawaree	jarwan hanan		Lady	charnee, dakan		Leprosy	kor	
Jerk, to	jarwahir		Lamb	beebee, dero		Letter	purzo, khat	chitthee.
Jewel	jarjariyo		Lame	gheto jo bacho	langro.	Level	sawon	
Jeweller	gabo		Lame of a hand	tonto	rundo.	Lesson	sabak	
Jest	charcho, thattho		Lamp	diyo		Lewd	luchu	
Jo	satar		Lamee	batayee	[motr.]	Liar	kurhu	jod.
Journey	ras	jaro.	Land paying a 3d to Govt.	sukko	bhoyon, jha-	Liberality	sakhawat	lerpiyo.
Juice	tir, kakh	kudan.	Land	jameendar	dad.	Libertine	khoblo	
Jot	trapan	achar.	Landholder	gillee	ghattee.	Lick, to	chatan	
Jump, to	nean, wichar	char.	Lamentation	bolee	rahan.	Lid	dhakan	
Justice	bad, let		Lane	ukan		Lie	kur	paran.
Inundation	babar, kafir		Language	gillee		Life	jee, sah, janam	ubhiyaran.
Infidel	rakhan, sambaran		Last, to	bolee		Lift, to	khanan	
Keep, to	kunjee	chabee.	Last year	pasal		Light	hallo	
Key	lat hanan		Laugh, to	khillan	postee.	Light, not dark	soiro	
Kick, to	hulwan		Lazy	thaddo, sust		Light, to	baran	
Kid	maran	lelro.	Lease	maswar		Lightning	vilj	khewan.
Kill, to	mayitree	kuhan.	Lead	siho		Like	jehro	
Kin	saggio, mitr	siya.	Lead, to	mouhmen wanyan		Lime	chuno, gaj	seeree.
Kinsman	baran		Leaf	pan, pauno		Line	liko	
Kindle, to	padshah		Lean	dubro, hino	patro.	Lining	astar	
King	chuman		Learn, to	sikan		Limb	ling	
Kiss, to	chuman		Leather	cham		Little	thoro, nando	
Knapsack	buyko		Leave	mokal		Little man	mandro	dimbro.
Knee	ghutno.		Leave, to	ch, hadan		Lion	sinh	
Knife	kap.		Leave, to food	obaran		Lip	chap	
Knof	har.		Leech	jhour		Living	jero	jiyado.
Knot	pururan.		Left, (not right)	khabo	jonk.	Load	bar	
Know, to	pururan.		Leg, (foot only)	per	(with thigh)	Load	bar	
Kidney	patang (the bird)		Leisure	palayee	tang, jhang	Lock	kulf, jendro	jaro.
Write, (of paper)					wandayee.	Long	dhriggo	

English.	Dialect of Sar.	Dialect of Lar.	English.	Dialect of Sar.	Dialect of Lar.	English.	Dialect of Sar.
Look, to	dissan	upatan.	Master	dhanee, ago	parch.	Money	paiso, roko
Loose, to	chhoran		Mat	nukh, toree	toro.	Monday	sumar
Loss, to	winyayan		Metal of a gun	palito	nich.	Moon light	chhandr
Loss	khot, ghat		Mean	kalino	arth.	Month	chhandiko
Louse	jun	nih	Meaning	morad	kach, han.	More	waddo
Love	piyar, mahabat		Measure, to	mayan	kach, himo.	Morning	subhaee
Love	hethan		Measure of grain	kaso	dawa, dabb.	Morsel	tukkar
Low	pajee, nich		Medicine	darun	chhain.	Mosque	masit
Low	makar		Meet, to	gadjan		Mother	maee
Locust	ashik [iron]		Melon	gidro, hindano		Motion	lodo
Lover	dooe, kafgeer, (of		Melt, to, in water	garan		Mouse	kuwo
Ladle of wood	papree		Melt in fire	pighran	sar, surt.	Mound	wat
Lobe of the ear	jeru		Memory	sud	kapri.	Mouth	gatto
Liver	pinee		Mendicant	jogee		Mouth of river	girah
Leg	kanchhee		Merely	rugo, fakt		Mouthful	ghano, bisear
Ladle for ghee	phakaree		Message	nevapo		Much	gap, garo
Lynx			Messenger	pandee		Mud	khachar
Lizard of the Gu-	goh		Middle	wich		Mule	khoon
ana kind			Midnight	adh rat		Murder	khasturee
Mad	chareo, chitto (as		Milk	kheer, khareo,		Musk	banduk
Maid	kunwanree		Milk and water	kheer, (sour)		Musket	kanjar
Make, to	karan	joran.	Mind	lassee		Musician	ahur
Male	nar		Minute	hiya		Mustard	mahboob
Mallet	watahro		Miser	khotr, khan		Mistress	ookhadee
Man	maru, nurs		Misery	pul	sos.	Mortar, gun	sas
Mango	amb		Mirror	suyon, shum		Mother of wife	ma mairjee
Malice	khundrah		Miser	arsee, aino		Mole	tir
Many	ghano, gach	ja'jo.	Misfortune	nibhag		Milt (or spleen)	tiree
Manner	rih		Mistake	bhul, chuk	dhundh.	Mustachios	mucha
Mare	ghoree, madiyan		Mistness	gadayan	wichhuran.	Mongoose	nor
Mark	nishanee		Mix, to	dairo	tikano.	Maina, (a bird)	kabar
Market	bazar		Mixed, to be				
Marriage	wihan, parnun		Monastery				
Marry, to	parniyan						

English.	Dialect of Sar.	Dialect of Lar.	English.	Dialect of Sar.	Dialect of Lar.	English.	Dialect of Sar.	Dialect of Lar.
Nail, finger	noh, mekh, of iron		Oath	son, sakpak	kan.	Owl	chib, chibro	pind.
Naked	ugharo		Obligation	thoro		Own	panjo	
Name	naw, nalo		Obvious	padro	uddim.	Overcome, to be	haran	metan.
Narrow	soro		Occupation	samundr		Obliterate, to	drayan	
Near	wejo, wat	odo.	Ocean	panhen		Other, on	ludro	
Necessary, it is	gurjee	kand, guto.	Often	ghana dinh		Pain	surpir	dukh.
Neck	gurje		Oil	tel	telee.	Painful	dukhee	
Necklace	geechee	nikkar.	Oilman	chakee		Paint, to	rangan	chittan, ratan
Need	har		Ointment	malam	poro.	Painting	chitr	kamangar.
Needle	gurjee		Old	kuraro		Palanquin	palkee [hand]	
Neelgye	sui	parosee.	On account of	babat		Palm	khajee, tiree, (of	
Neighbour	parecho		Once	hekar		Palace	maree	
Neighbourhood	paro		One	hekre		Pan	kanabee, tawon	
Nephew (brother's)	bhatriyo, bhanjo,		Onion	basar	ukhelan.	Pair	joro	
Net	iharo [(sister's)	hod na.	Only	beklo	mat.	Parrot	kagar	
Never	kadhee na		Open, to	patan		Paper	chattu	
New	nawo, koro	samachar.	Opinion	deeyan	takro.	Parrot	namuno	
News	sama		Opium	afeem		P'atfern	pay	darmaho.
Niece	bhatree bharjee		Opportunity	waro		Pay, to	mahino	chukayan.
Night	rat		Opposite	samen	ander.	Passage-boat	paiso diyen	
No	na, nahee	hulla.	Oppression	julm	hukm.	Pawn	gharano	
Noise	kuk, bakhero		Order	parwano	maneeah.	Pawn-broker	pattan	parchayo.
None	ko nahee	ba pahr.	Orphan	choharo		Peace	gaho	
Noon	majj-and		Ornament	ghahnah	mur, murho	Peacock	mahajan	del.
Nonsense	jakh	hinamund.	Other	biyo	murgo.	Peashen	sulh	
Nonsense, to talk	jakh, maran		Origin	bekh, par		Peculiar	matar	nisar.
North	uttar		Originally	bekhee	uthtayan.	Peg	mor	kir
North	nak		Otherwise	nikar	chhandis,	Pen		lekhnee.
Note	chithee, ruko		Oven	tanoor		People	motee	
Nourish, to	nipayan		Over	par			niro	
Now	hane		Overturn, to	lelayan			lokal, maru	
Numbering	gantee		Outparts	bahraee			kalam	
Nutmeg	jaeephar		Outside	bahar			lok, maru	

English.	Dialect of Sar.	Dialect of Lar.	English.	Dialect of Sar.	Dialect of Lar.	English.	Dialect of Sar.	Dialect of Lar.
Pepper	merch	miriyun.	Plough	har	katal.	Push, to	ghelan, rerhan	thelan.
Period	je, kadhen	tano. [mana,	Poison	weh		Push,	dnak	thabo.
Perhaps	mokal	mala, shal,	Police office	ghontan	ujaran.	Put, to	rakhan	payan.
Permission	hairan	marhal.	Polish, to	winjar		Prickly heat	arayee	
Perplexed	rolo		Polisher of guns	dhand, dubbo	dhoro.	Penitence	gisee	
Perplexity	maru	jano.	Pond	thikkar		Partridge	fittar	
Person		disnun.	Potsherd	yabu, tattu	doddo.	Pathless	awatar	
Personable	dando	for,	Pony	kangal	nimano, we-	Pity [journey	baj	
Pestle for bhang	arzee	[grain, &c.	Poor	kuttan	[charo.	Provision for a		
Petition	paro	ghaghee.	Pound, to	buro	mitaran.	Pick axe	kodar	
Peticcoat	chundan		Powder	haran, wijhan	sagh.	Picher	kaozo	
Pick up, to	achar	Pour, to	Power	was		Plater	surchoo	
Pickle	tako, bane, of than.		Praise	wakhar		Pleades	kateoon	
Piece of cloth	kabutar		Prave	gangat		Pus, (corruption)	poon	
Pigeon	goree		Prayer	dua	taran.	Pox, small	seyar	
Pillar	thamb	thunee.	Prevent, to	jhalan	dhono.	Palm of hand	taree	
Pilgrimage	jearat	jatr.	Present	sukhree		Paralytic	mando	
Pillow	wihano		Present	hazir		Penguin	peean	
Pipe	nari		Presence	daban, nipuran	muhar.	Quadruped		whaitr.
Pipe for smoking	hukko	chilam.	Press, to	mul, agh	peeran.	Quarrel, to	wiran	
Pistol	tufancho		Price	ranjak	baha.	Quarrel	jhero	
Place	jae, kand		Priming	chabutro		Quarrelsome	weru	
Plain, (clear)	pat		Prison	pui	parapat.	Quarter of a rupee	pawlo	
Plaintain	kevejee pharee	pharo.	Prisoner	labh	akar.	Quarter, (direc-		
Plaster	lep	malam.	Privy	hulayan		tion)	dis	
Plaster, to	layan	limban.	Profit	chhikan		Question	puchha	
Plate	rikabee	patr.	Pride	saja	jugat.	Quicksilver	paro	
Plate, covered	dhanku		Publish, to	chelo	sikhaman.	Quiet	math	
Play	rand		Pull, to			Quiet	mathiko	
Play, to	rand karan		Pen			Quiet	mathkar	
Plunder	phurb, lut		Penishment			Rabbit		
Packet	gothree	khiso.	Pupil					saho.
Plain dealer	wesurah		Purposeonly					

English.	Dialect of Sar.	Dialect of Lar.	English.	Dialect of Sar.	Dialect of Lar.	English.	Dialect of Sar.	Dialect of Lar.
Rain	minh		Repose	aram	sui.	Sack	boro	
Rain, to	minh payan		Reprimand, to	ghurkan	tawaran.	Saddle	haumo, katro	
Raise, to	uthiyaran		Reproach	drapo	ubhalo.	Saddle of camel	kajawo	pakro.
Raisins	drakh		Reputation	bharam	sakh.	Sail	sir	
Ikascal	haranjado		Return, to	waran	motan.	Sailor	muhano	
Rat	kuwo		Rice	pausree		Salt, (Salt drier)	lun (nonaree)	
Razor	parke	wanchan.	Rich	chawar	whaiyin.	Saltpetre	soro	
Read, to	pahun		Riches	hundwaro		Sand	waree	
Ready	taiyar		Riddance	kund,		Sash	lungee	
Ready, to be	sambran		Ride, to	bacha		Saffron	kesar	
Real	sat		Right	ghore te charhan		Save, to	bachayan	
Reason	sabab	karan.	Right, (with stone)	sajho, theek		Say, to	chawan, puchan	
Receive, to	watan, ginan		Ring, (with a moondree chattee)	datr	dadh.	Scabbard	khup	
Recompence, to	rijayan	rasan.	Ringworm	pakko		Scaldhead	ganjo	
Recommendation	parat	sefaras.	Ripe	uthiyan		Scales	trakree	tarazu.
Rear, to	nipayan		Rise, to	daryan, wah		Scales of a fish	chhittar	
Rear, to (as a horse)	shekathee thiyan	nira kharan.	River	phoran	kasee.	Scarce	thoro	kaulo.
Rectitude	sachayee		Rob, to	phoror	choran.	Scholar	khutabee	
Recollection	sambhar		Robber	phuro, chor	khosan.	School	maktab	khutab
Reconcile, to	parhayan	thahayan.	Road	dhay, wat	pand.	Scissors	kattar	khainchee
Red	ratto, garo	lall.	Roof	chhat		Scorpion	wichu	bhatun [kar
Redness	garan		Room	kotee		Scrap of paper	chattee	kagurjo tuk-
Refuge	sam		Rope	mur, par	wadr, rasee.	Scratch, to	khajan, khotran	
Reel to, cotton	[ger to		Round	noree		Sea	samundr	
Refuse, to	katan, dakan, stag-	motayan.	Round	gol		Seal	mubr	
Reins	lugam		Rose	grulab	ghontan.	Search, to	golan	khojan
Rein. part of do	wag		Rub, to	pihayan	doran.	Season	mund	mahal
Relation	sang, mair		Run, to	drakan, bhajan		Secret	gruj	[an
Religion	eeman	dharam.	Rust	kat, mer		See, to	dissan, niharan	pasan, wajay-
Remember, to	sambaran	saran.	Rupee	rupayo		Seed	bi	
Repeat	nirano		Rump	sathar		Seldom	kadhen, kadhen	kaulo
Radish	mooree		Ring dove	guru		Self	pan, jhind	pino
Report	wahee, awaz		Roc, (a bird)	guran pukhee		Send, to	viknan	[an
							moktan, ponchay-	rasayan

English.	Dialect of Sar.	Dialect of Lar.	English.	Dialect of Sar.	Dialect of Lar.	English.	Dialect of Sar.	Dialect of Lar.
Separate	dar		Sickle	datro	danto.	Snuff		nas
Seraglio	janano		Side	paso	dis.	Snuff box		dunghee, dublee
Serpent	naug	sirp, sapp.	Sieve	gechan	paran.	Snuff, to		nas watan
Servant	belee	noukar, cha- [kar	Sight	ningah		Soap		sabun
Service	belipo	noukaree.	Sign, to	hath akar wijhan	sahee k aran.	Soft		koowaro
Settlement	chukayan	chukat.	Silence, to	math karan		Soldier		sipahee
Sew, to	sibban		Silent	math		Some		ko
Shallow, (water)	tango		Silk	pat, chandee		Somebody		ko maru
Shadow	pachhaee		Silver	gayan		Sometimes		keheen mahal
Shake, to	lodan, lodayan		Sing, to	bhen		Something		kin kin
Shame, to	lajan		Sister	bihan	addee.	Son		putr
Shameless	nirjo		Sit, to	cham, khal		Son-in-law		jatro
Shape	muhandro		Skin	ubh		Song		rag
Share	bhanggo	watt, bahro.	Sky	bano	asman, akas.	Soon		siggo
Sharp	tikho		Slave	nindr	gaharat.	Sound		wace, taka
Shave, to	kuran		Sleep	suman		Sound, to, v. n.		wajhan
Sheep	gheto, ridh	ghatto.	Sleep, to	hawren		Sound, to, v. a.		wajhayen
Shepherd	darar		Slowly	jutee	khallo,	Sour		khatto
Sheet	chadar, rawo		Slipper	juteehanan	khallahanan	Sparrow		dakhan
Shew, to	dikharan		Slipper, to	nandro	mado.	Speak, to		jurkee
Shield	dhal	sipar.	Small			Speak, to		chawan
Ship	beree, dhoondee		Smear, to (with oil)	makan		Spear		bhalo, naizo
Shoe	juttee, mochro		Smell	was		Speech		gath
Shoemaker	mochee		Smell, to	sungan	singan.	Spend, to		kharchan
Shoot, to	banduk hanan		Smoke, to	dunh		Spinning, to heel		air katanjo
Shop	hath		Smoke, to	dunh karan		Spit, to		jhukan
Shore	kandee	puso.	Smoke in pipe	chilam chikan		Spite		wer
Short drawers	mandro, mindro	bindro. kanch.	Snatch, to	khasan		Spirit, to		winyayan
Short drawers	ubsae		Shirt	jamee, angrakah		Sow, to		pokhan
Sight	golee, rejo		Spider	koreero		Sprinkle, to		chhandan
Shot	kuho		Sneeze, to	chink dewan		Spy glass		durbeen
Shoulder	payan, bandan	puran, butan.	Snore, to	gogra kasran		Squeeze, to		dadan
Shut, to	nachango	sukhalo.	Snow	barf	paro rohi.	Squall		
Sick						Stairs		charnee

[ran.

khabra bha-

English.	Dialect of Lar.	English.	Dialect of Sar.	Dialect of Lar.	English.	Dialect of Sar.	Dialect of Lar.	Dialect of Sar.	Dialect of Lar.	English.	Dialect of Sar.	Dialect of Lar.
Stand, to	ubhiyan	Sugar	khandr		Tall					Tall		
Stack, of	turee	Summer	unharo		Tea					Tea		
ree	taro	Sun	sijj	adit.	Teapot					Teapot		
Star	ch, hirk	Sunday	achar, itwar		Teach, to					Teach, to		
Start	ch, hirk-an	Sunshine	us		Tear					Tear		
Stay, to	tikan	Support, to	sambhalan		Tell, to					Tell, to		
Steal, to	phoran	Surround, to	weran		Tenant					Tenant		
Stable	tambelo	Suspended		adhotar.	Ten					Ten		
Stall	wado	Suspicion	guman	bharan.	Tenth					Tenth		
Step	perajo rand	Swallow, to	gihan		Tent					Tent		
Stink	kin	Sweat, to	son kharan		Then					Then		
Stink, to	gand.	Sweat	pagghar		Thence					Thence		
Stirrup	kinno thiyen	Sweat, to	paggharjan		Therefore					Therefore		
Stock, (of a gun)	rikab	Sweeper	chuhro		There					There		
stocks	kundak, katt	Swing	hindoro		Thick					Thick		
Stone	rahan, kod	Swimmer	ludan		Thief					Thief		
Stone of a ring	tik	Sweet, (sweet ba- sil)	taru		Thing					Thing		
Stool	manjee	Sword	mitto, (nazbu)		Think, to					Think, to		
Stool, to	wach	Small copper coin	tarar		Think, to					Think, to		
Storm	bihan, rokan	Small copper coin	kaseero		Thirst					Thirst		
Stop, to	akhancee	Small copper coin	damree		Thirsty					Thirsty		
Story	sawon.	Saltpetre	kalar		Thither					Thither		
Straight	siddo	Stand for hanging			Thread (spun)					Thread (spun)		
Strangle, to	ghaghao diyen	a cauldron on	marang	[of iron	Threat					Threat		
Strangulation	ghoghio (aree)	Spoon of wood	doero, chamcho,		Threaten, to					Threaten, to		
Straw, (of wheat)	boh, karb, (of jaw- foro	Screw	keeree		Thistle					Thistle		
Skein, of thread	kanan	Squinting	treddo		Threshold					Threshold		
Strike, to	saggo, dhago	Tail,	punch	punchree.	Throat					Throat		
String	kapra lahan	Tailor	darjee		Throne					Throne		
Strip, to	dado	Take, to	watan, jhalan	kabu karan.	Through					Through		
Strong	eluro	Take down, to	lahan	sogo karan.	Throw, to					Throw, to		
Such	ochto	Take care, to	sar lahan		Thrust, to					Thrust, to		
Suddenly					Thunder, to					Thunder, to		

English.	Dialect of Sar.	Dialect of Lar.	English.	Dialect of Sar.	Dialect of Lar.	English.	Dialect of Sar.	Dialect of Lar.
Thunder	gor	wisfat.	Tremble, to	dhudan	dhakan.	Urine, to		
Thursday	khamis,		Tribute	koum zat		Use	mutan	
Thus	iyen		Trouble	malee	dhal.	Useless	faido, kam	
Tie, to	bandhan		Trrowsers	dukh	kapat.	Upper garment	peerahan	
Tiger	sinh		True	sathan		Velvet	bakhmal	
Tight	soro	kasel.	Trust	sachcho	bharoso.	Venetian	butkee	
Till	toree taean	lagan, sudhee	Try, to	wesah	azmayan.	Very	ghano	
Time of famine	thakayan	wirehayan.	Tune	sach	sur.	Vessel	ghano chango	seetaramee.
Tire, to	thakako	thakel.	Turban	parkhan		Very well	fateh	
Tired	thakan		Turn, to	pag, patko		Victory	kamino	sobh.
Tired, to be	lakab	ghusphus.	Turn, v. a.	phiran, ghuman	ghumayan.	Vile	got, wastee	raj.
Title	galhayan		Twice	ba pher		Village	got maru	
Titte tattle	tamaku		Twist, to	war diyen		Villager	sirko	
Tobacco	perjo angur	hekando.	Turnip	gogru		Vinegar	jor	
Toe	nal, sath	subhane.	Thumb	likh		Violence	gadjan	sur.
Together	subhaee		Torqueise, small	angoot		Visit	wae	
To-morrow	parin		Thumb	phikoo		Voice	kadhan	
The day after to-morrow	jhibh		Tasteless	kungaru		Vomit, to	ok	
Tongue	hathiyar		Tower	kataee		Vomiting		
Tools	dand		Tickling	ojtee		Wait, to	bihan, tikan	
Tooth	dandan	dandan.	Tripe	musru	bhundo.	Wager, to	hod bandhan	
Toothpick	matho	danderee.	Tailor bird	kaswatee		Waist	chel	
Top	lagan	chhuhan.	Test for metals	buchro		Wake, to	jagan	
Touch, to	kachhwa		Ugly	mamo, chacho		Walk, to	haian	
Tortoise	chilkan, niyun		Uncle	heth		Wall	bhit	
Tow, to	pase, de		Under	jhanan	samjan.	Want, to	guran	
Towards	shahr frando	nagar.	Understand, to	jistonsee		War	jung jero	
Town	wepar	sodo.	Until	te, mathe		Wash, to	dhuan	
Trade	wataru	pandheru.	Upon	te		Washerman	khatree	
Traveller	khazano		Upright	ubho		Watch, (guard)	paharo, jago	pet, charho.
Treasure	wan per		Upside down	lath		Water	panee, sandaro	
Tree	thur					Weary	thakko [water bag]	

English.	Dialect of Sar.	Dialect of Lar.	English.	Dialect of Sar.	Dialect of Lar.	English.	Dialect of Sar.	Dialect of Lar.
Weak	hino		Witness	shahid		Youth		
Weather	wa		Woman	zal		Yours		lasiyar.
Weave, to	unan		Wood	kathee				
Weaver	koree, uninwaro		World	galh				
Wedding	wehan		World	dunya, haj				
Week	sat dare		Worn	kiyon				
Weep, to	ruan		Worth	mul baha				
Well of water	k huh		Wound	gha				
Weigh, to	taran		Wrap, to	weran				
West	olo	ulanhado.	Wool	un				
Wet, to	pusayan		Write, to	likhan				
What	chha		Writer	likhanwaro				
Wheat	kanak	kujaro.	Wrong	kurho				
When	kadhen		Widower					
Whence	kithan		Wick of a candle	wat				
Where	kade	ki the	Woolen thread	oonsutr				
Wherefore	kinakare	kujare lai.	Woodcutter	batharu, dayo				
Which	kebro		Whirlwind	wachoro				
Whip	chamkee	korro.	Watermill	aitr pokhinjo				
White	achho		Water	petoo				
Who?	kebro	kerh.	Weak-sighted	chuncho				
Why	koh	kujare.	Wrist	karaecon				
Widow	runera	ran.	Wood, an insect that destroys	sasar				
Wife	zal	joe, ba.	Weasel	aoreero				
Wind	wa		Wild duck	arce				
Window	daree		Year	warcnh, lal				
Winter	siyalo		Yellow	zafaran, zaido				
Wipe, to	malan	khadkan.	Yes	han				
Wise	siyano		Yesterday	kal				
Wisdom	siyanupo		— day before	tiyodih				
Wish	gur	siyanaf.	Young	jawan				
With	san							
Within	wich, manj							
Without	bahar							

NAMES OF DIFFERENT ARTIFICERS AND THEIR IMPLEMENTS.

<i>English and Sindee.</i>		<i>English and Sindee.</i>	
<i>Carpenter's Tools.</i>		<i>Cotton Spinner's Implements.—</i> (continued.)	
Adze	wahlo.	Brush	seeree.
Auger	sarahce.	Reel	bhanyanee.
Adze, 2nd	adee.	Roller	taro.
Bevel	goona.	Top of comb	rachh.
Bricklayer's hammer	tesho.	Shuttle	naro.
Compasses	pargar.	Tredde	chapree.
Chalk line	rango.	Part of do.	paisar.
Tile	kanaho.	Lever	phirnee.
3-Cornered do.	sohano.	<i>Goldsmith's Tools.</i>	
Guage	khat kash.	Anvil	sandan.
Hand saw	karahee.	Anvil block	adee.
Hatchet	kuharo.	Blowpipe	dawnee.
Oilstone	rohee.	Brush	waruchee.
Plane	rando.	Crucible	katoree.
Rabbiting plane	jaree rando.	Large brush	patrahee.
Plummet	shal.	Coal chisel	chhenee.
Mortice chisel	rambho.	File	rawatee.
Small do.	rambhee.	Forceps	chath.
Large rabbiting plane	darajo.	Hammer	matriko.
Smaller do.	maicho.	Small do.	chorasu.
Smallest sort of do.	peshro.	Ladle	rajo.
Saw	kart.	Mould	top.
Smallest hand saw	jabano.	Pincers	anbur.
Trowel, or rather	jehband.	Punch	sumbh.
A flat piece of wood for plastering	tunko.	Shears	kat.
Largest sort of do.	daskhatt.	Tongs	saraj.
<i>Potter's Tools.</i>		<i>Shoemaker's Tools.</i>	
Cutting string	wijho.	Awl for cloth	khawndee.
Flattener	tapnee.	Awl for leather	ar.
Ditto	kanero adare.	Lap stone	rohee.
Wheel	chak.	Mallet	moongra.
<i>Turner's Implements.</i>		Rubber	kewar.
Auger	bhrimo.	Plank	takhto.
Bow	kamanjah.	Frame	kalib.
Chisel	rambh.	Shoemaker's knife	rambee.
Do. small	rambhee.	<i>Cutler's Tools.</i>	
Gouge	nahee.	Adze	wahlo.
Point	bharakee.	Gouge	nahee.
Rappets	jandree.	Cutler's grindstone	siranee.
Rest	seerahee.	Knife	rambhee.
<i>Cotton Spinner's Implements.</i>		Burnisher	karee.
Loom	hastree.	Hand saw	karahee.
Comb of do.	phanee.	Oil vessel for polishing	tilandee.
Wire of do.	saraee.	Pumice stone	karand.
Parts of the Loom	manee.	Wood for do.	kapatee.
	adlakkee.	Scraper	rando.
	rassee.	Powderer	mooee.
	kalee.	<i>Carder of Cotton.</i>	
	naree.	Pestle	taro.
bhirnee.	Roller	panatee.	
khirkee.	Bow of carder	dawnee.	

* Carpenters do all the Bricklayer's work in Sinde, or rather the two Trades are united in one person always.

English and Sindee.

Carder of Cotton.—(Continued.)

Catgut	nar.
Carder	pinyaree.

Bookbinder.

Lapstone	rohee.
Rubber of wood	mungro.
Compasses	palgar.
Stamp for flowers	sambho.
Iron ruler	khat kash.
Press	shikanjo.
Rubber of stone	mohro.
Knife	kat.
Polisher, (wood)	
with vermilion die	khewar.
Brass pen for mark- ing	kalam jalwalee.

Blacksmith.

Anvil	sandan.
Sledge hammer	wadan.
Hand do.	matriko.
Tongs	ubhra.
Pointed anvil	mekh sandan.
File	rawatee.
Punch	chhenee.
Large tongs	oobhr waddo.
Auger	sarahee.
Borer which forms the barrel	burko.
Pointed do.	bhrimo.
Wooden rest	charkhee.
Press	sikanjo.
Nut of do.	dedeo and takhto.
Screw	pech.
Wooden anvil	adee.
Pile	neemgarda.
Punch	sumbh.
Large bellows	khalee dhawajee
Poker	anguro.
Nose of bellows	beeoo.

Cornice-maker,—Kamangar.

Needle	suo.
Lever	chilmurdo.
Hair brush	mooeo kalam.

Bracelet-maker,—Churangar.

Lathe	jantr sukhajajo. sand.
Rest	sakhall lohajo.
Bow	kaman.
Chisel	karbana.
Chisel	pat mahtano.
Point	borakee.
Ditto	cheeran.
Ditto	singaree.
Grindstone	seran.
Point	naho.
Stock	manjee.

English and Sindee.

Coppersmith,—Misgar.*

Hammer	wadan.
Shears	kat.
Tongs	ambooree.
Poker	angooree.
Brasier*	thantaru.

* Same as the above.

*Parts of the Spinning Wheel,—Suman
antrjo.*

Foot	manjee.
Legs	jangh.
Upright	moona.
Winch	makree.
Axle	latan.
Spokes	taree.
Axle tree	guj.
Distaff rest	chamotee.
Distaff	trak.
Thread	dor.
Cotton round the distaff	peer.
Shoulder	gareoo.

Black pepper	mirch.
Colocynth	truhajee gar.
Myrrh	gugur.
Wadf roomee	wadf roomee.
Scammony	mahmoodah.
Ginger	soonth.
Henbane seed	jani khorasane.
Euphorbium	kheer kowarjo.
Parsley	garfu.
Sweet basil	naug kaisar.
Hyacinth	mur.
Polypody	jalwataree.
Galangal	nagar moonth.
Zedoary	kafoor kachree.
Thorn apple	dhatooa. chareoo.
Zedoary	jädwar.
Satyrion	salibh.
Marsh mallows	bij khairajo.
Mehilot	agar.
Sweet cane	taj.
Cassia	chatrak.
Fumitory	sindoleon.
Mustard	ahur
Wood	datoro. sitawar.

Wild spikenard	trakara.
A cathartic root	treej.
A Boq rush	katoola.
Aniseed	wadf.
Beanpods	doop sangara.
Wood of aloes	agar.
Rue	kinee bootee.
Indian spikenard	kamal patr.
Myrabolan	awrah.
Belleric myrabolan	baherah.
Dried grapes	drakh karee.
Rind of myrabolan	wawgang.

<i>English and Sindee.</i>		<i>English and Sindee.</i>	
Sesame	kalamchee.	Pomegranate	flow-gul darujee.
Liquorice, (the juice)	sheeri mitthee kat-tee.	Gum lac	[ers lakh.
Capers	karwalee.	Tamarind	gidamree.
Silk	pat.	Ber	zizyphus jujuba.
Orange	sangtaree.	Dog's bane	chhilmkanee.
Barberries	zariskh.	Honey	makhee.
Cardamoms, large	wadda phota.	Nutmeg	jafar.
Do. small	nandra phota.	Cinnamon	khal dalcheenee-
Rosin	pareah.	Nightshade	peru. [jee.
Melissa	balango.	Leaf of do.	kawal.
Ruby	chunee.	Ceruse	[lentil safeta.
Red coral	goonata.	Stone, shaped like a	damra pahan.
Pearl	mootee.	Juniper berries	waund.
Seed of ash tree	andayee.	Pomegranate leaves	daroo pan.
Musk	khastoree.	Asparagus	nang dawau.
Water lily	gul koonajee.	Nitre	jau khar.
Bole ammoniac	songeru.	Senna of Mecca	Sana makajee.
Testicles of the	khasiya ludra.	Linseed	bekh kahojee.
Cubebs [beaver	kalab cheenee.	Armenian grain	mahlat.
Tin	kalaae.	Marjoram	pneer.
Fumitory	peeta pipar.	Cherry	jamalgoto.
Cocoanut [leaves	nariyal.	Costus	kath kathia.
Juice of neem	raswal.	Pumpkin	kadu.
Lawsonia inermis	mendee.	Southernwood	boee madeena.
Saffron	bakhru.	Anise	sooa.
Poppy seed	khas khas	Betony	bakaren.
Juniper	ahoover	Burnt brick	guhat.
Ashes of bamboo	bhains lochan.	Mint	phudana.
Wild sorrel	chuko.	Yellow myrabolan	harir.
Tulsee	langajo bij.	Do. black	harir kara.
Red rose	gul-i-gulab.	Sarcocolla	guna.
Beetlenut	suparee.	Scuttle bone	samundr pheene.
Worm seed plant	kando.	Hemp	bhanga.
Melon seed	gedarejo bij.	Rapeseed	sir.
Nut-like pistachio	narzah.	Nettleseed	ootawgan.
Liquorice	mittee kuthee.	Spinage	jefangar.
Cucumber	badrang.	India thorn	dramaha.
Long pepper	pepree.	Fenugreek	matheejo bij.
Cypress root	lesoorah.	Clove	lawang.
Fruit of tamarisk	sakar.	Extract of oil	sheer sirijee.
Oak apple	mawa.	Nosesmart	ahroo.
Pomegranate	daru.	Hemp seed	bhanga.
Saffron	kaisar.	Bastard saffron	pawara.
Gum arabic	khor.	Trefoil	bij shambajee.
Poppy	dodejee khal.	Wild carrot	gajar khorasane.
Coral root	par marjan.	Sorrel	sag.
Amber	kapur.	Wild rue	harmal.
Dragons' blood	paho surkajee.	Damascene plumb	alu bhokhara.
	bekh morah.	White dog rose	bahman acho.
White sandal wood	sirkhand.	Red do.	bahman garho.
Red do.	ratanan.	Coriander seed	dana.
Oyster shell	sipee.	Chinese rhubarb	rewand cheenee.

Report on Upper Sindh and the Eastern portion of Cutchee, with a Memorandum on the Beloochee and other Tribes of Upper Scinde and Cutchee, and a map of part of the Country referred to. By Lieutenant J. POSTANS, Assistant Political Agent. From the Political Secretariat of the Government of India.

1st. "Upper," known in the language of the country as *Sirra*, or the northern division of Sindh, may be said to extend from Sehwan on the south, to Bukkur and Roree northward, and to include the whole tract of country tributary to the Khyrpoor and Hyderabad chiefs on the plain of the Indus, east and west, between these places (Sehwan and Bukkur). Our political division of Upper Sindh, however, is of a much more limited extent, and includes only the Khyrpoor possessions, and the lands and revenues derivable by the Hyderabad Ameers from [Shikarpore and its dependencies. To this division I shall confine my observations.

2nd. Khyrpoor, the capital of the chiefs of that branch of the Talpôr family, is situated to the eastward of the river Indus, about sixteen miles south-east from Roree, (the ancient Hindoo capital of Sindh,) and about ten miles from the river in a direct line. The territory tributary to the Khyrpoor family extends to the north to Subzulkotee; south to Mittanie, (on the river); eastward of the river to Shahgur, belonging to the Dejee chief, Alli Moorad; and westward of the river to Tull, capital of the Beloochee Purgunnah of Boordekur, on the borders of the Brushhooree desert, which separates Upper Sindh from Cutchee. The possessions of the Ameers of Hyderabad in Upper Sindh dependent upon the populous and important town of Shikarpoor, extend to about eight miles west of that town to Asseemghurry; east to about six miles, (Khanpore); south to about eight miles (Lukkee); north to Rajhan and Mobarickpûr.

3rd. The soil throughout the whole of the tract of country above mentioned, may be generally described as a rich alluvial, alternating occasionally with loose sand, rich and highly favorable for cultivation; the whole is within the influence of the inundations of the river Indus, which commence to be available for purposes of cultivation in April and May, and cease in September or October. The land when cultivated is unusually productive, but owing to a scanty population,

and mismanagement on the part of the rulers a comparatively small portion is brought under tillage, and the inundations are allowed to flow through immense tracts of country, without being rendered available to the purposes of cultivation.

4th. In the Khyrpoor territories eastward of the river, of the various productions of the soil, indigo is the most valuable, and in some parts, of a description superior to that of Bhawulpore and the Punjab. The staple productions of Upper Sindh, however, are sugar-cane, (near the river,) jowaree, wheat, barley, moong, gram, cotton, tobacco, sirshuf, (mustard seed,) rice, badjree, and the other grains common to India. In the vicinity of Shikarpoor, the poppy is extensively cultivated; wheat is the great *rubbee* or spring, and jowaree and rice the *khurreef*, or autumnal crops. Cultivation commences in April and May by means of the inundations, and the crops are reaped in October and November. The wheat, or *rubbee* crops are raised by irrigation from wells, or *bunds*, formed from the inundations. The soil of Upper Sindh, (as indeed throughout the whole of both divisions of that country,) is strongly impregnated with saline matter, and a thick incrustation of salt is every where observable on its surface. Saltpetre is produced in great quantities, and Sindh is noted for its powder. I shall conclude the above brief remarks on the soil and cultivation of Upper Sindh by observing, that this tract of country is favored beyond most others, with extraordinary natural capabilities, and that causes into which it is not necessary to enter here, would appear alone to prevent its being thickly populated, and for its given space, one of the richest and most fertile districts of the East.

5th. The general appearance of the country is an uninterrupted flat, its uniformity in this respect being only broken by a low range of limestone hills through which the river flows at Sukkur and Roree; these extend to some distance towards Khyrpoor on the eastern side; but for a short distance from Sukkur, on the eastern bank where cultivation does not obtain, the soil is covered with a thick low jungle of the tamarisk bush and baubul and camel thorns. In the vicinity of Roree and Shikarpoor, are some rich gardens, and the mangoe, date, acacia, neem, mulberry,* and poplar trees obtain great size and perfection; but expect at these places, a tolerably sized jungle tree

* There can be little doubt, but that silk might be advantageously cultivated in this country.

is rarely met with to break the monotony of a complete level, and universally low tamarisk jungle. The whole country is intersected with canals and water-courses, and many portions during the height of the inundations are for miles completely under water. This is particularly the case in the neighbourhood of Shikarpoor, and the intermediate tract between it and Sukkur, the river having of late years shewn an inclination to the western, to the detriment of the lands and revenue of the Khyrpoor possessions on the eastern, side.

6th. I have before observed, that Upper Sindh is thinly populated, towns and villages are scantily sprinkled over the country. Of the former, the most important in the whole of Sindh, for its wealth, population, and trade, is Shikarpoor, situated at a distance of about twenty-eight miles N. W. from Sukkur; its general appearance is like that of all others in Upper Sindh, filthy and ill built, its walls in total disrepair, and surrounded by large stagnant pools of water; it is redeemed, however, by its gardens. The population of Shikarpoor by a late census may be about 30,000, of whom 20,000 are Hindoos. All the trade and banking transactions for which Shikarpoor is noted all over India and Central Asia, are in the hands of the Hindoos, who enjoy an unusual degree of toleration, and have obtained an influence which the policy of the rulers dictates should not be disturbed. Khyrpoor is a paltry ill-built town, possessing few claims to notice as a place of trade or wealth, and only important as the residence of the chiefs, Meer Roostam and other members of his family. Meer Alli Moorad, his brother, has his stronghold at "*Dejee Kha Kote.*" Roree retains some of the remains of its former wealth, and from its position on an elevation overlooking the river, has an exterior of respectability, little according with its interior state of dilapidation and decay. Sukkur may be said to be a ruined and deserted town, though there can be no doubt, both of these places will daily acquire greater importance, from our influence on the trade of the river Indus, and the countries on its banks. Beyond the above, there are at present no towns which may be classed as of any size or importance in Upper Sindh. In certain divisions of the country under a Beloochee zemeendaree, a small mud fort generally forms the residence of the chief, and capital of the tribe. The villages are a collection of mud huts, with a flat roof; the out-houses are formed of reed mats, and in many villages the dwell-

ings are entirely of the latter, the excessive dryness of the climate rendering them sufficient for the protection of the inhabitants; a small mud *tower* is generally to be seen in the centre of the village, forming a sort of stronghold, and few patches of cultivation are without the same refuge for the husbandman. There is little in the appearance of the towns or villages of Upper Sindh, to impress the observer with a favorable opinion of the condition of its inhabitants, and the whole forms a striking contrast to the air of comfort and security, to be met with in other provinces and countries, far less favoured with natural advantages than Upper Sindh.

No. 2.

1st. There are no rivers in the division of Upper Sindh, to which this memorandum is limited; the two great canals
 Rivers and Lakes. which form outlets to the waters of the Indus, are first the "Sindh," which has its mouth a few miles above Sukkur, and passes within a mile of Shikarpoor, proceeding towards Larkhana. This canal is the great means of irrigation to a large extent of country between Shikarpoor and the river, and of immediate value to that town in providing inland navigation for much of its trade during seven months of the year; it has been neglected, however, though a small outlay would increase its value and importance to the revenue; as well as add to the resources of trade and cultivation.

2nd. The "*Bijaree*" nullah, has its mouth in the Beloochee pergunnah of the Khyrpoor territories westward of the Indus, known as "Boordekur," about twenty miles higher up than the Sindh, and waters a great extent of country passing through the above pergunnah, and that of Koopore as far as Kajhan on the edge of the desert. Innumerable smaller canals are led from the two above mentioned, such as the "Noorwah," "Murwah," "Ruswar," &c.

3rd. There are no tanks in Upper Sindh, though it is unnecessary to observe, that they might easily be constructed, and to the great advantage of the country during the dry season, *i. e.* from October to March. The inhabitants of the districts obtain a scanty supply of water from temporary wells dug in the beds of nullahs, a well of masonry and natural springs being seen but rarely, except in the larger towns.

No. 3.

In Upper Sindh, there are no periodical rains, and *its* year would therefore appear to have only two seasons; viz. the hot and cold. The natives of the country, however, divide it into three; viz. *Bahar* (or spring,) *Tabistan* (hot season,) and *Zemistan*, (cold season,) and strictly speaking, it may, from its latitude, be thus divided. The spring is of very short duration, for the cold up to the end of February is often very great, whilst the heat from the commencement to the middle of March, is little exceeded by that of the three following months, and the period of a temperate climate therefore between the extremes of the cold and hot seasons is very brief. The hot season may be said to commence from the middle of March, and continues generally without intermission until the end of August, or middle of September. Storms of thunder with rain occasionally occur in June or July, affording a temporary cessation from the intense heat; but they are by no means to be depended upon. A curious phenomenon is observable in this country on the setting in of one of these storms, it being always preceded for two or three days by a close atmosphere, loaded with a fine description of sand, giving the effect of a thick fog; but immediately previous to the bursting of a storm, the air is literally darkened by immense volumes of sand, driven in black masses before the wind, obscuring the whole surface of the country. These sand storms are the natural effects of the desert tracts surrounding Upper Sindh, over which no violent wind can pass without raising clouds of the shifting sands which cover their surface. With the exception of these passing storms, Upper Sindh is free from the annoyance experienced on this account in the delta during the prevalence of the south-west monsoon. The heat of Upper Sindh from the middle of April to the end of July, is said to exceed that of any part of India, and the range of the thermometer has been known in a verandah to have reached 145°; in a tent it is by no means uncommon to find it at 120°; the hot winds continue to blow severely till midnight, but the mornings are generally cool. The atmosphere is remarkably dry, and generally clear, the ranges of the thermometer during the hot months, do not indicate any great variation. Storms of rain are frequent at the vernal equinox.

During the cold months, *i. e.* from October until the end of February, the climate of Upper Sindh is pleasant and salubrious, frost and ice occasionally occur, and vegetation assumes the appearance of winter in a northern climate. The sun of Upper Sindh is singularly fatal in its effects, not only upon the European, but the native constitution, and during certain periods of the year, exposure to it by the people of the country is as much as possible avoided. There can be no doubt that the climate of Sindh is most trying to the health of Europeans, and a residence of two or three years in it, would undoubtedly tend much to undermine the constitution. During the subsiding of the inundations ague is very prevalent, but in its mildest form. Although Upper Sindh is not exempted from the diseases and epidemics common to the East, it is yet as free from them as most places, and but for its intolerable heat, would be far preferable in point of climate to Lower Sindh, or the Delta of the Indus.

No. 4.

Our acquaintance with Upper Sindh has been too short, to allow of accurate statistical inquiries, and I cannot therefore venture any remarks on this head. A census which is now in progress of the town of Shikarpoor would seem to shew, that the estimates formed of the population of the principal towns in Scinde, Upper and Lower, have been overrated; thus, Shikarpoor was calculated at 50,000, its real amount being somewhat under 30,000. The population of Upper Sindh may be divided into three classes, Hindoos, Sindhees, and Beloochees. The Hindoos carry on all the trade, not only in the large towns, but are the means of supplying the necessaries of life to the whole of the inhabitants of the country, and few of the smallest villages are unsupplied with a Banyan's shop. The Hindoos of Sindh are necessarily, from their position in a Mahomedan country, a degraded and tolerated class; they are the only people, however, who amass wealth, and to this end are content to suffer any degradation. So useful are the Hindoos in these countries, that their lives and property are generally respected by the most lawless tribes of Beloochees, and they have establishments in the heart of the hills, at "Deerah" and "Khan," the strongholds of the Murrees and Boogties. The Soucars of Shikarpoor are

well known for their wealth and banking influence in India, and the countries North-west, where few of the marts are without agents from Shikarpoor, and hoondies are procurable at that place, from Calcutta to Khiva.

The annexed memorandum which I had formerly prepared on the different tribes inhabiting the tract of country between Sukkur and the Bolan Pass, including as that tract the part of Upper Sindh I have alluded to, will it is hoped, supply any further information required, as to the classification of the inhabitants.

No. 5.

1st. *Animals*.—In the jungle and wastes of Upper Sindh, are found the hyena, jackal, hare, partridge, (black, painted, and common grey,) quail, oobarn, (a description of *Otis*, between the floriken and bustard;) and in the tanks and marshes, caused by inundations, wild fowl of every description and in great quantities. The wild hogs commit great destruction in the cultivation, and are a favorite source of amusement to the wealthier Sindhians and Beloochee Chiefs, who hunt and shoot them. The tiger and leopard, are said to be found in the neighbourhood of Sukkur; but it is doubtful if they descend lower than the Bhawalpore territories, where they are said to be numerous. Hawking is a favorite method, amongst the poorer classes, of catching quails and partridges, both of which abound in Upper Sindh.

Natural Productions.

2nd. In the *Botany* of Upper Sindh, there is nothing of interest; the medicinal herbs, roots, or gums in common use, or for purposes of trade, are supplied from other places.

3rd. *Minerals*. In that spur of the Sullimani range, known as the Murree and Bogtie hills, from the tribes inhabiting them, sulphur and alum are found in some quantities, and form important articles of trade. The settlement of these distracted districts will eventually afford us the desired opportunity, of further enquiry, and doubtless of improvement in the working of the mines. A stone of any description, beyond the limestone procurable at Sukkur and Roree, is not to be seen between the river and the hills* above mentioned, and

* The Murree hills are for the most part composed of sandstone conglomerates and lime.

to a depth of sixty feet below the surface, nothing but the finest description of sand is observable, the superstrata being the alluvium before alluded to.

No. 6.

The gardens of Upper Sindh produce the plantain, apple (very small description,) vine, (Caubul,) nectarine (inferior) mulberry, mangoe, (a superior kind,) date, tamarind, jumboo, lime, (sweet and sour,) and pomegranate trees, melons, (from Kandahar seed, &c. of a very fine description,) all the country vegetables common to India; hemp is cultivated for its seed, *bang* being in common use throughout the country, and amongst all classes. The European vegetables thrive remarkably well at certain seasons of the year, and the potatoe might be introduced to great advantage, as it is found to answer admirably.

2d. Implements of agriculture are of the rudest kind, the plough is smaller, and not so heavy as the common Indian plough; the seed is thrown in the soil after the slightest surface has been raised, no manure is required or used, the inundations bringing with them a certain quantity of slimy matter, highly conducive to fertility. The land is allowed to remain fallow from the period of reaping one crop in the autumn to that of sowing the following spring crop, when a few days are sufficient to prepare it for the seed. Agriculture is, in short, of the simplest kind, nature having done too much for man in these countries to induce him to exert himself in improving the soil by artificial means.

3d. The domestic animals are the buffaloe, a small but useful description of white cattle, sheep, and goats. The camel is had in great quantities in these countries, but is of a size and class inferior to those either of Marwar or Central Asia. This animal is in general use in Upper Sindh.

No. 7.

1st. The commerce of Upper Sindh is confined to Shikarpoor, Khyrpoor, and Roree, a general list of the imports and exports of the former, which is the great mart of the country, will, however, prove sufficient. Shikarpoor

Commerce and
Manufactures.

receives from Karrachee-bunder, Marwar, Mooltan, Bhawulpore, and Loodhiana, European piece goods, raw silks, ivory, cochineal, spices of all kinds, coarse cotton cloths, raw silks, kimkaub and silk manufactures, sugar-candy, cocoanuts, metals, *kirum*, (or groceries,) drugs of sorts, indigo, opium, dyes of sorts, and saffron. From Cutchee, Khussan, and the North-west, raw silk, fruits of sorts, madder, turquoises, antimony, medicinal herbs, sulphur, alum, saffron, assafœtida, medicinal gums, cochineal and horses. The exports from Shikarpore are confined to the transmission of goods to Khorassan, through the Pass of the Bolan, hence Shikarpore is one of the gates of Khorassan; and a trifling trade with Cutchee, they consist of the following: indigo (the most important,) henna, metals of kinds, country cloths, European piece goods (chintzes, &c.) Mooltan coarse cloths, silks manufactured, groceries and spices, raw cotton, coarse sugar, opium, hemp seed, shields, tobacco, embroidered horse cloths, and dry grains. Through the excessive jealousy of the *Ahilkars* at Shikarpore, in revenue matters, it is difficult to ascertain the value of the trade of the place; but some estimate may be formed from the revenue thence derivable, and the amount of this last year was ascertained to have been about 55,000 rupees from commerce, (see list of duties by the author published in the Bombay Government Gazette, under date the 28th July). The manufactures of Upper Sindh are confined to the preparation of coarse cotton cloths, particularly in the Khyrpore territories, and at Roree to the weaving a coarse description of silk fabric, known as "*duryan*," from the raw silk imported from the North-west. In artizans of every description, this country is totally deficient, and even the preparation of leather, for which Lower Sindh is somewhat celebrated, is quite unknown in Upper Sindh.

No. 8.

The Khyrpore possessions in Upper Sindh consist of 14 Talookahs Talookahs and Villages, and 556 Villages, thus:—

<i>No. of Villages.</i>	<i>Names of Talookahs.</i>
137	1. Derbela.
43	2. Kundearee.
51	3. Ghagivree.
31	4. Khyrpore.

<i>No. of Villages.</i>	<i>Names of Talookahs.</i>
89	5. Height Tuppahs.
15	6. Der.
15	7. Bhoong Baud.
5	8. Subzul.
23	9. Boordekur.
15	10. Chakmazarchee.
13	11. Roopal.
66	12. Scattered.
48	13. Laddah Gajan.
5	14. Shuldadpore.

556 Villages.

The amount of revenue divided between the 16 members of the Khyrpore family is about 20 lacs annually.

The Talookahs and Villages appertaining to the Shikarpoor Pergunnah, from which revenue is derivable by the Ameers of Hyderabad, are as follows:—

<i>No. of Villages.</i>	<i>Names of Talookahs.</i>
5	1. Mahal Kahee.
7	2. ——— ——— Lukee.
5	3. Mobarickpore.
6	4. One-third of Roopur.

23 Villages.

The amount of revenue derived from the above is 1,18,500 rupees, divided between Meers Noor Mahomed Khan and Meer Hussen Khan, (the former 75,000 and the latter 43,200.)

Shikarpoor, 1st August, 1840.

Memorandum on the Beloochee and other Tribes of Upper Sindh and Cutchee.

1. Few tracts of country of equal extent present so great a diversity of tribes as that lying between the Indus at Bukkur, and the great Pass of the Bolan, and as the new position which we at present occupy in Affghanistan, has rendered this portion of country an open line

of communication, and consequently brought us in connection with its inhabitants. The following list of the various tribes, with their subdivisions may be considered interesting. A map accompanies this memorandum, which explains the portion of country occupied by each tribe, whether Sindee or Beloochee. In the memorandum, the towns, villages, cultivated or waste lands, &c., are not given, as the subject may form one for a more statistical and detailed report hereafter.

No. 1.

A numerous tribe of cultivating Beloochees, inhabiting the whole of the intervening country between Sukkur and the

Khosahs.

Sindh canal, towards Shikarpoor, and from thence,

to the westward of Rajhan, along the edge of the desert. The Khosahs are not a predatory tribe, but employ themselves generally as cultivators. The portion of their country between Sukkur and Shikarpoor, is rich and productive, owing to its facilities for irrigation. The Khosahs during the Kalarah dynasty, had considerable possessions to the eastward of the river Indus, beyond Khyrpore. This tribe has four sub-divisions,—

1. Kulloolanee, (the chief is of this tribe.)
2. Bukiume.
3. Toneeanee.
4. Sooreeanee, (near Rojahan.)

Tributary to the Khyrpore government, and the chief holds jaggeers under a sort of feudal tenure.

No. 2.

The Juthooee are a small tribe, inhabiting the tract of country

Juthooee Beloo-
chees.

immediately to the east of Shikarpore, extending to the Indus in that direction, to the confines of

Boordekur and the Sindh canal, on the north and south. The Juthooees were predatory, but the Khyrpore government, to whom they are tributary, has considerably restrained them, and they now bear a good character as quiet cultivators. The encroachments which the neighbouring tribe of Beloochees are constantly making on the Juthooee lands, has occasioned a feud between the two tribes, shewing itself in repeated acts of violence, which are stopped by the chiefs,

when they become mutually detrimental, under a compact of peace, for a certain period. The Juthooees have the following subdivisions:—

- | | |
|---------------|---------------------|
| 1. Brahmanee, | 7. Sungujur, |
| 2. Bejaranee, | 8. Rodranee, |
| 3. Budanee, | 9. Sheran, |
| 4. Shadingur, | 10. Khosan, |
| 5. Julleelee, | 11. Seyed Khananee. |
| 6. Sahawanee, | |

The principal town is Durapur, situated to the east of Shikarpoor about twenty miles. The Juthooee country is necessarily productive, in consequence of its facilities for irrigation.

No. 3.

The Boordies form a numerous and powerful tribe of Beloochees, inhabiting the country to the north-east of Shikarpoor. The bounds of Boordekur extend to the south to the Indus; north to the Soolyman range and the Boogtie country; east to Gooblah, and the Budanee, and Kulkee tribes of Jutt; and to the west to midway between Tull and Meerpore. There are four principal Sirdars, or heads of tribes in Boordekur.

Boordekur is rich and productive, being advantageously situated for irrigation from the river. Jowaree is the principal cultivation, wheat, however, is in some parts plentiful. The Boordies are essentially a predatory tribe; their whole country is tributary to Meer Rustam of Khyrpoor, and pays in kind according to seasons. The Boordies are sub-divided into fourteen tribes, as follows, three of them have again their sub-divisions:—

- | | | | |
|-----------------|----|---|----------------|
| 1. Boonglanee, | .. | { | 1. Shuragye. |
| 2. Ghajhanee, | .. | { | 2. Kunderanee. |
| 3. Kuneesanee, | .. | { | 3. Dyreeanee. |
| 4. Nidwanee, | .. | { | 4. Sahulkanee. |
| 5. Bajkanee, | .. | { | 5. Sahutranee. |
| 6. Buhulkanee, | | | |
| 7. Dahanee, | | | |
| 8. Japie, | | | |
| 9. Bukeraneec, | | | |
| 10. Chohilanee, | | | |

- | | |
|---------------------|--|
| 11. Tighanee, | |
| 12. Soondraanee, .. | { 1. Loolwee.
2. Arbaee.
3. Jageranee. |
| 13. Sooranee, | |
| 14. Bujraanee, .. | |

Principal Town, Trull.

No. 4.

The Jummallees, a poor, and not numerous tribe of Beloochees, cultivate and feed flocks at Rajhan, and other places along the southern edge of the Bunhooree desert; they have also villages in Cutchee.

Jummallee tribe of Beloochees.

The Jummallees are robbers; and have been associated with the Jekraanees. The tribe is subdivided as follows. Their chief, Lusker Khan, of Rajhan:—

- | | |
|-----------------|---|
| 1. Rundanee, | 3. Dusktee, |
| 2. Moondraanee. | 4. Shirkananee, (the chief is of this tribe.) |

No. 5.

The Khyberries affect to be Sheikhs originally from Affghanistan; their sacred character, however, did not protect them from the lawless Doomkie and Jekranie tribes, who drove them from their lands and villages, on the other side of the desert, and obliged them to seek for refuge at Khanpore, about eight miles westward of Shikarpoor. The Khyberries muster about 800 men, and are a peaceable tribe; they have no subdivisions.

Tribe of Khyberries.

No. 6.

A Beloochee tribe, cultivators and feeders of flocks at Manewtie, and in the direction of Kunda, not numerous or powerful, having been much oppressed by the predatory tribes. The Oomraanees have eleven subdivisions.

The Oomraanee tribe of Beloochees.

- | | |
|-----------------|--------------------|
| 1. Tungeeanee, | 7. Pulleeanee, |
| 2. Barrachanee, | 8. Jungheekhanzye, |
| 3. Ghumeeanee, | 9. Sazuzye, |
| 4. Ferozanee, | 10. Rindanee, |
| 5. Belanee, | 11. Muzaranee. |
| 6. Mulghanee, | |

No. 7.

This is a Scindee tribe, scattered over a large tract of country, and occupied entirely as cultivators, and rearers of cattle.

Tribe of Jutts.

Some of the Jutts, the *Beyahs* for instance, are wealthy and powerful as zemindars, but the tribe is for the most part composed of a poor and wandering class, who occupy moveable habitations, and lead an unsettled life, shifting their positions as forage and water may render necessary. The Jutts are peaceable themselves, but exposed to the constant violence of the predatory tribes in Upper Sindh; under a vigorous and protecting Government, they would become useful subjects; at present, immense tracts of country formerly cultivated by them, are lying waste. Subdivisions of the Jutts,—

- | | |
|--------------------------------|-----------------------|
| 1. Beyah, (the most powerful,) | 12. Lodruh, |
| 2. Sudayeh, | 13. Kooharah, |
| 3. Buthoond, | 14. Wuggun, |
| 4. Deyah, | 15. Tihern, |
| 5. Kuhahpootrah, | 16. Gomu. |
| 6. Bookujaut, | 17. Purvur, |
| 7. Surkee, | 18. Sutarh, |
| 8. Durodgurt, | 19. Mehira, |
| 9. Oomur, | 20. Bungah, (Cutchu,) |
| 10. Joonejhur, | 21. Budanee, |
| 11. Marafanee, | 22. Kalkee. |

There are other subdivisions, but the above are those located in Upper Sindh.

No. 8.

A numerous, and essentially predatory tribe, inhabiting the hills to the northward of the Bershoree desert. Their capital and stronghold is Deerah, sixty miles eastward from Phoolajee. There are fifteen subdivisions of this tribe,

Tribe of Boogtie
Beloochees.

and they are said to muster about 3,000 men, principally foot. The chief, Beburuck; eldest son, Ahmed Khan; second son, Islam Khan.

Subdivisions.

- | | |
|---------------------|-----------------------|
| 1. Rarjah, (Chief.) | 9. Notanee Ferozanee, |
| 2. Kulpur, | 10. Notanee Durruk, |
| 3. Mussoorie, | 11. Soondeeanee, |
| 4. Noakanee, | 12. Rumazye, |
| 5. Moondranee, | 13. Scorkurree, |
| 6. Keyazye, | 14. Phong, |
| 7. Shumbranee, | 15. Chundrazye. |
| 8. Seydanee, | |

No. 9.

Though not numerous, the Jekranees were the most active and formidable of the marauding tribes, and were for many years the terror of the whole line of country lying between the Indus and the great defile of the Bolan. Their former capital was Chuttur. With the advantage of having an asylum in the Boogtie hills, they shared plunder with that tribe, in consideration of the shelter afforded them. Chiefs, Durya Othun and Turk Allie; all mounted men.

Tribe of Jekranee
Belooches.

Nine Subdivisions.

- | | |
|-----------------------|-----------------|
| 1. Subwanee, (Chief.) | 6. Soolkanee, |
| 2. Majanee, | 7. Moolkanee, |
| 3. Seeapaz, | 8. Kurrookanee, |
| 4. Sooramaneer, | 9. Durkanee. |
| 5. Nodkanee, | |

No. 10.

Mustering about as many men as the Jekranees, with whom they were linked as plunderers. The Doomkie chief, Bejai Khan, was the acknowledged leader of both tribes, and had his stronghold at Phoolajee, commanding the great Pass to Deerah and the Boogtie hills; Bejar Khan has one son, Wuzzeer Khan.

Doomkie Be-
loochees.

Thirteen Subdivisions.

- | | |
|-----------------------|-----------------|
| 1. Meerozye, (Chief.) | 8. Kurkkorie, |
| 2. Muhamedanee, | 9. Talanee, |
| 3. Brahimanee, | 10. Loondh, |
| 4. Baghdar, | 11. Seenghanee, |
| 5. Shubkhar, | 12. Guzyanee, |
| 6. Deenaree, | 13. Wuzeranee. |
| 7. Gongee, | |

No. 11.

This tribe of Beloochees is considered to be the most numerous and powerful of any below the Bolan Pass. They inhabit the northern portion of the range of hills bordering Cutchee to the West and North, called after the two tribes, "the Murree and Boogtie hills," though a spur of the Sullimani range. The Murrees are essentially predatory and warlike; their depredations extending to Bagh, Gundava, and the whole of Cutchee, with the Bolan Pass, and Hummund and Dajel in the Seikh territories. The Murree chief, Dodah Khan, has his stronghold at Kahan, a respectably sized fort, situated in a well watered plain, of about six miles in its greatest extent, and exceedingly productive; particularly in wheat. Kahan is distant about sixty miles in a North-westerly direction from Phoolajee, passing through defiles, and therefore much exposed to annoyance from an enemy. Kahan is the only fortified place which the Murrees possess in the hills; but there are other strong positions well supplied with forage and water, to which they betake themselves when driven from the fort. The Murree country is well supplied with running streams, and its villages are exceedingly productive. The climate, in consequence of its elevation, is much milder than that of the plains, the thermometer averaging for the month of June 1840, the maximum 97°, and at 8 P. M. 85°;* rain is of frequent occurrence; roads pass through the Murree country to Hummund, Dajel, Rozan, Dera Ghazee Khan, and Mooltan, and are traversed by merchants, bringing goods from thence to Cutchee, Gundava, Bagh, and other places, in that direction, on which black mail was of course levied. The Murrees, like other hill

* At Lehree and Phoolajee in the plains, the thermometer during the same month stood at 120° in a tent.

tribes, though nominally tributary to the Khanate of Kelat, have ever affected independence, and tribute was rarely, if ever, exacted.

The Murrees have subdivisions as follows:—

- | | |
|--|------------------|
| 1. Guznanee, (the Chief
is of this sub-division,) | 8. Roonganee, |
| 2. Beejaranee, (Dukel
Khan,) | 9. Soomranee, |
| 3. Lallwanee, (Lall Khan,) | 10. Koomgaranee, |
| 4. Seealkosh, | 11. Pommoadee, |
| 5. Bundeeganee, | 12. Soolwanee, |
| 6. Madenee, | 13. Shajoo, |
| 7. Ballaree, | 14. Soheranee, |
| | 15. Sheranee, |
| | 16. Moomdane. |

The Murrees may amount to between 2 and 3,000 fighting men, of whom 3 or 400 only are mounted; the country they inhabit, being unfavourable to Cavalry.

1. The preceding are the tribes inhabiting the line of country between Sukkur and Lehree in Northern Cutchee, as also the hills to the north and west of the latter.

General Observations.

Beyond Lehree, there are also the following Affghan and Pattan tribes skirting the hills, and in the low country, between Lehree and Dadur: the Khujucks, a large tribe, are at Sibbee, to the westward of the latter place.

- | | |
|-----------------------------------|----------|
| 1. Shadozye, (Affghans.) | |
| 2. Sheeroone. | „ |
| 3. Buzdar, | „ |
| 4. Kutrians, (Chief, Meer Hujee.) | |
| 5. Dunums, } | Pattans. |
| 6. Loonee. } | |

From Brushoree, northward and westward to the Bolan and Gundava Passes, are the tribes of *Rinds*, *Abnahs*, and *Mughsus*; only the former of these are Beloochees. The two latter are Jutts. The *Rind* Beloochees claim precedence over all the Beloochee tribes, and are said to have formerly possessed the greater portion of the country on this side of the Brushoree Desert, now subdivided amongst the various tribes enumerated; they are now, however, but few in number, and have their locality at Shorunr near Bagh, under the Chiefs Sirdah Khan, and his son Shah Allie.

2. Of the preceding tribes, the Khosahs, Juthooes, Jumallees, and Boordies, are subjects of the Sindh Government; but the tribes inhabiting the country northward of the Brushoree Desert, were until the late establishment of H. M. Shah Shoojah's authority, tributary to the Khan of Khelat.

The Doomkies and Jekranees, formerly the most lawless and predatory of the tribes inhabiting the plains, are now peaceably settled as cultivators, many of them being enlisted for police duties in Northern Cutchee, whilst the lands which they usurped from the Kyberrie tribe, have been returned to their lawful owners, and others assigned for the subsistence of the two tribes alluded to.

3. The cultivating classes of Beloochees and Sindhees, such as the Khosahs and Jutts, were constantly exposed to harassing forays, and thus the former, finding no security for life or property, left the tracts of country which they formerly cultivated in Northern Cutchee, and confined themselves to this side of the Desert. A better system of things, has, however, induced many of the Khosahs to return to Lehree, and the neighbourhood of Shapore.

4. The Beloochees, as seen in Upper Sindh and Northern Cutchee, are a large muscular race, particularly the hill tribes of Murrees and Boogties. Their features are large, and decidedly Jewish, while the custom of allowing the hair to grow to a considerable length, depending over the shoulders and falling wildly on the forehead, (a very uncommon habit among Mohammedans,) imparts to the Beloochee's countenance, a remarkably ferocious expression.

5. The Beloochees, who may be considered as foreigners in Sindh, possess an unwritten dialect peculiar to themselves, apparently mixed up considerably with both Pushtoo and Persian.

6. The character given by the neighbouring people to the Beloochees, is proverbially bad,* and there is every reason to believe it to be not unmerited. The predatory habits of the Beloochee, seem not to have been forced upon him by circumstances of necessity,

* The term Beloochee, or as it is spelt in the language of the country *Baloche*, is thus analyzed:—

B.	<i>bud</i> ,	bad,
C.	<i>lubee</i> ,	covetous, (Sindee.)
W.		wild, unsettled.
Ch.	<i>chor</i> ,	a robber.

since the country he inhabits, possesses capabilities of no ordinary kind, but rather from a natural propensity to lawless practices.

The Beloochees are vindictive, treacherous, and cruel. In their feuds, they hold no terms but blood for blood, and while committing their depredations, spare neither age nor sex.

7. As may be expected from a totally ignorant people, uninformed on all but the merely external observances of the Mahomedan religion, the Beloochees are to the highest degree superstitious. The office of a Syud is so much respected by them, that he forms the only security for the faith of tribes towards each other, and is himself the only individual whose life is safe in the hands of a Beloochee.

8. Unrestrained in these countries, as the Beloochee tribes have been, in consequence of the lax nature of the Governments, they are not now disposed to yield willing submission to new systems of controul, calculated to check the long established freedom of their lawless habits, and compel them to the acknowledgement of a regulated authority.

9. The Beloochee tribe of Northern Cutchee, have ever been more dependent upon plunder than cultivation, which seems in accordance with their habits of idleness and dissipation. With the produce of the country at his disposal, it was scarcely probable, that the wild and lawless Beloochee would settle as a quiet agriculturist, consequently the small portion of these tribes who come under the denomination of "cultivating classes," are usually found to be the dependents or slaves* of influential chiefs.

10. In Boordekur, and other portions of the country to the southward of the Burshoree desert, the Beloochees being of a less decidedly predatory class, cultivate more extensively than those above mentioned.

The restraint which good government will impose on these tribes, with the aid of patient encouragement to peaceful occupation, must in time effect a reform in their habits and practices. The general character of the country they inhabit, as one possessing capabilities of great fertility,† is in every way favorable to the object in view,

* Slavery obtains amongst the Belooche tribes, children being bought and sold or exchanged, for goods in kind.

† The effects of the inundations of the Indus extend to the vicinity of Rajhan; all the intermediate country being as capable of fertility as any part of the rest, and

and there can be little doubt eventually, but that these semi-barbarous tribes will afford a proof of the radical change, which a just but energetic system of rule may effect in a country, and the condition of its inhabitants.

SHAWL.

The district of Shawl is situated between $29^{\circ} 50'$, $30^{\circ} 50'$, and $66^{\circ} 4'$, $67^{\circ} 20'$.

This district is bounded on the North by the Tukatoo mountains; East by those of Zurgoon and Jhurkoo; West by Chuhul-tun; South by the Bolan range. The general aspect of this country is hilly, rocky and sterile, particularly the southern aspects; but where mould exists, which is the case on many of the northern faces, vegetation is luxuriant. Many of the hills are composed of mica and talk; coal of an inferior description is found in the Bolan Pass.

The soil in the valleys is rich and of a light brown colour, and although water never reaches many of them, save that which falls from the heavens, the southernwood and many other sweet-smelling herbs grow luxuriantly, and in spring flowers of various descriptions carpet the vallies. The soil generally is well adapted to all descriptions of horticulture and agriculture, particularly all kinds of English vegetables. The greater portion of the valleys lay waste in consequence of no water being procurable for irrigation, but here and there small patches are to be seen, which entirely depend on rain for coming to maturity. In these valleys, the artesian wells might

when cultivated, wonderfully productive. To the north of the Burshoree desert, the river *Narie* to the west, and abundance of water found at a short distance from the surface in the Eastern part of Cutchee, offer every facility for irrigation and cultivation. The jawaree is principally cultivated in the plains, and wheat on the hilly country, the crops are unusually rich.

Note.—One tribe has been omitted in the foregoing paper; viz. that of Mugherie, having their locality to the South of Wagh, at Jullah Khan; Chief, Ghullam Nubbee.

Sub-divisions.

- | | | |
|-----------------|---|------------|
| 1. Hajeizye. | } | Belochees. |
| 2. Bumbeeranee. | | |
| 3. Bhund. | | |
| 4. Arbanee. | | |

be adopted with success. That which is termed the valley of Shawl, is at an elevation of about 5,500 feet above the level of the sea, and has advantages over most of the surrounding country, being in most parts abundantly supplied with water from small mountain streams; and that part which is under cultivation, produces very rich and beautiful crops.

There are no large rivers, but one or two considerable streams,
 Rivers. the chief of which is the Sosa, into which most of the inferior streams empty themselves.

The year may be considered to be divided into four seasons: spring,
 Climate. which commences in March and lasts till May, during which time the thermometer ranges 70°, lowest 50°; summer, from June to August, range of thermometer, highest 80°, lowest 76°; autumn from September to November, range of thermometer, highest 60°, lowest 40°; winter, from December to February, range of thermometer, highest 50°, lowest 30°. The prevailing winds are westerly and southerly, and always cool; a good deal of snow falls in the valley in January and February.

The population of Shawl may be estimated at about 4,000 men, a
 Population. third of whom are Kasees, (or cultivators of the soil,) 2,000 may be reckoned as Afghan Kakurs, and the remainder as mixed tribes, including the Hindoos of the town of Quetta.

Wild Animals. The hills of this district abound with wild sheep, goats, and hogs.

A great variety of English plants are found, and a variety of
 Plants. English trees, shrubs, and herbs are to be found, such as cherry, almond, hawthorn, barberry, &c. &c. Also the juniper, which grows to the height of from eighteen to thirty feet. Within eight miles of Quetta, there is a forest of this description on a piece of table land, affording an inexhaustible source of fire wood, as also rafters for building. The wood of this tree is exactly similar to that used in cedar pencils, and the scent equally aromatic. The assafœtida grows in abundance in these hills. The orchards in the vicinity of the town and villages are very beautiful, composed of apricots, mulberry, greengages, plum, pear, apple, pomegranate, &c. interspersed with a variety of other trees, such as the

poplar, willow, may, &c. The fruits though good, are not equal to those of Candahar and Cabool.

Minerals. Iron is found in some parts of the district.

The chief agricultural produce is wheat, barley, mukah, (or Agriculture. Indian corn,) rice, peas, lucerne, mujeed, (or madder,) carrots, baugluns, spinnage, cucumbers, pumpkins and melons.

Implements of Agriculture. Common small Indian plough, spade, and hoe.

No wheeled carriages.

Manure. Dung of cattle, burnt stubble, and black earth from the town.

Good sized bullocks for carriage and draught, camels, and sheep in

Domestic Animals. abundance.

It produces madder, wool, carpets, blankets, and numdars or felts;

Commerce and Manufactures.

madder and wool are the only two articles exported, and those inconsiderable, in consequence of the great consumption in the country, their habitations being chiefly also of blanket; thin grain-bags and tapes are made from the wool, the staple of which is eight inches, but coarse. The whole of the inhabitants are clothed in numdah cloaks, &c. The revenue of Shawl at present, does not exceed 24,000 Rupees per annum.

Various Routes in Scinde from official documents from Bombay, of March 1840, communicated by the Government of India.

Route from Sehwan to Kurrachee direct, Quarter Master General's Office, Camp Kurrachee, 12th February, 1840.

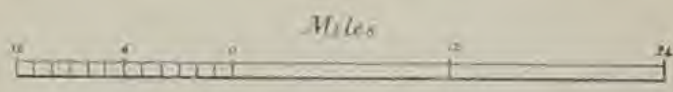
Sehwan to Roree, eleven miles and half a furlong. From the gardens

Tarrae a middling village, is passed at four and a quarter miles, and Cuchee, Bajar, and Jangur, three large villages, from two to three miles distant, on the right bank, about nine miles from Sehwan. Forage was got by the grass-cutters, above Aree Peer, also kurby to purchase.

south of the town, near the river, two small chopped villages, with some cultivation and three wells; a nullah was found with a good supply of water, about one mile on the S. W. of the village. A small stream runs through Aree Peer, about a mile and a quarter to the westward, and a good supply of water always to be found one mile further, in the same direction, in the bed of the river; the road is very good over a level plain.



Map
of the Route from
SUKKUR
to
DADUR and KAHUN
in the
Murree Country
by
Lieut Postans, B.A.
Asst. Sill Agent Sunde



Engraved by Waller & Co. Park Street

Present extent of the Inundations
of the Indus.

* Tribes

Lat 28°

Lat 29°

Warkee river, near its junction with Chorla river.—The Warkee river is small, and joins the Chorla river about

Forage was scarce, but furnished by the grass-cutters from the banks of the river.

half mile on the right, near which there is a pool of water, at the foot of a rock, which terminates

Loond hill, and which lasts all the year. Warkee

camp appears to be the usual halting place, and had more grass about it than where the dragoons encamped; there are two roads which separate at the place where the Dheeng river is crossed about four miles from Roree, one running on each side of Loond hill and meeting again one mile in front of Warkee; the road running to the right of Loond hill, along the Chorla river, is longer, but reported better. The halting place by it is called Chorla Mukam, near some ancient tombs, where there were also fine pools of water in the river. The other road is more stony, as it crosses the Dheeng river two or three times. Camp at the Mulleeree river, ten miles. Some good pools of water stated to last all the year. Forage scarce, but procurable by grasscutters about the river and on the hills on the right; the ranges of hills on each side approach much closer, and at four miles the road enters the defile of the Joorung river, and continues along its bed and banks for about three miles very rough and heavy, and some rocky nullahs afterwards are crossed before reaching the camp, on Pokrun river, twelve miles and three and a half furlongs. Extensive pieces of deep water, and a small stream running. There is no village seen since leaving Roree, though some of the shepherds of the country brought in some goats here; there is a good deal of thinly scattered jungle amongst which the shepherds' huts are located. The road continues to ascend slightly until the fifth mile, crossing four or five rocky nullahs running into Mulleeree river; it is then better with a slight descent, and crosses some nullahs running southward into the Pokrun river. Forage more plentiful, but procured in the same manner by the grass-cutters, about the river banks.

Kajoor camp on the Kajoor river, nine miles and four and a half furlongs.—Good pools of water. This is the same river with the Pokrun, but the forage not so plentiful; the road is pretty good in general, crossing the river at the sixth mile; at the eighth mile it is confined between the hills and the river for a short distance, where it is rocky, and crosses the river again, to camp; roads run off here, and about

midway to Moohun Kote, a fort of the Ameers, beyond the hills on the left.

Doobah camp on the Doobah river, eight miles and two furlongs.—Good pools of water on the same river, here called the Doobah. Forage as above. The road is pretty good all the way, through thin jungle, crossing ten or eleven nullahs, some of which are considerable.

Murraie Mukam on the Murraie river, nine miles and three and a half furlongs.—Water in the sandy bed of a broad river. Ahmed Khan's Tana, a large village with good supply, is about two miles S. W. further up the river ; it is the residence of the soobadar of the district ; two other small villages lie between it and the road called Mahomed Khan and Jansir, but neither have any supplies. There are two roads here, one running on each side of a low range of hills ; that to the left is the usual route, and the halting place at Meerkhan Tanna, a village with two or three shops, and is also on the bank of the Murraie river with water from pits in its sandy bed. The guides brought the detachment by the other road, as having more water ; and on account of its being nearer the large village of Ahmed Khan, the road pretty good.

Dumajee, nine miles and six and a half furlongs.—A small village of about twenty choppered huts, and a few Banian supplies ; water from two wells, and a pool of rain water in the bed of the river, all of which were exhausted and found insufficient for the detachment, and part of the camels were not watered. Forage more plentiful, but some distance on the plain to the front and rear of the stage by the road ; the road pretty good.

Trak Mukam at Trak river, nine miles and three and a half furlongs.—The Trak river is crossed at nine and a quarter miles, and water is found in its bed at all seasons, about two miles on the left at the base of the hills, through which it passes to the Southward. The distance is not increased by going to this point, though so far off the beaten camel road, and paths go direct to, and from it, before reaching the river. Forage abundant, and the road good through jungle, and some cultivation at the fourth mile.

Bhoot Camp, two miles and seven and a half furlongs.—A place at the Huttul-ke-Bhool hills, where a nullah contains a good supply of water from the late rains, with plenty of forage ; country covered with thin

The roads to Je-rakh and Hyderabad cross here.

jungle and grass, but Trak should be the halting place, making Kuttajee the next stage.

Kuttajee Mukam at Kuttajee river, twelve miles and three furlongs.—The river about six furlongs on right, has good pools of water, which never fail, especially at the base of the hills here, where it passes through the range to the S. W. Forage as above; the road is in general good, excepting where it crosses some nullahs, and is a little confined between the river and some low hills on left at the eighth and ninth miles, where it is stony, then good, through jungle bushes to Kuttajee.

Gorban Camp at Gorban River, six miles and four furlongs.

This long march was made from an expectation that from not having gone off the road to Trak, a distance of from three to four miles had been saved, which was not the case as it proved. The confluence of the Gorban and Kuttajee rivers, both having small running streams and large pieces of standing water; forage not so plentiful, the road at two miles from Kuttajee has a slight but stony ascent, at the top of which the Gohar tullao occurs, at present filled with rain water. At three and a half miles, a rocky ghaut or defile commences, and continues an easy descent passable for guns; but, being most of it bare rock, is rough; it crosses two stony nullahs, at the bottom; at four miles some more rising ground is passed from the nullah, when the road is good again along the Kuttajee river to camp, crossing the river at the junction.

Dumba Camp, ten miles and two furlongs,—is on the Dumba river, which had good pools and a small stream of water running. Forage is procurable by the grass-cutters in considerable quantities about Dumba, but more plentifully a few miles before reaching it; the road is in general good, and passes Peepulwaree river and Mukam at six and a quarter miles, which has water in some small wells at present dug in its bed, and a good deal of short grass and thin jungle.

Camp Kurrachee to the lines of the Grenadier Regiment by the high road, seventeen miles and one and a half furlong.—This road is that generally travelled, and is longer than that by Dozan about one mile, but stated to be much better; the first thirteen miles being over an extensive level plain, in most parts thin jungle, but, a good well beaten track; at nine and a half miles Reekee Koree and two huts are passed,

on the left, but the well is small. Amree nullah, at present containing pools of water from the late rain, is passed at ten miles; at thirteen miles the road runs through some rocky ridges and uneven hard ground, passing a pool of salt water at thirteen and a half miles on the left, and is then good to camp. Kurrachee town two miles. Total 146 miles and one furlong.

(Signed) N. CAMPBELL, *Major,*
Acting Quarter Master General of the Army.

Reconnaissance of the Route from Tatta to Kurrachee, January, 1839.

The distances stated were those given by the perambulator. The sketches as far as Gorah were taken in the direction of that place, laid down in the protracted route of Lieut. Maxfield, but were afterwards filled in from the distances by perambulator, and by a few bearings taken in the general directions, and to remarkable objects on the right or left of the road. No detailed survey was attempted, and these are merely intended to give an idea of the character and direction of each day's march.

From the Hill above the Camp to Googah.

One mile.—A dry nulla with deep sides, which would require to be cut down. The road to this descends the hill by a very easy slope covered with milk bush. The road is stony, and winds a good deal among the bushes. Several baubul trees grow about the nulla or canal, and it is bordered by a few bushes. The country, after crossing the canal, opens out into a plain, over which the road is very good.

Two miles and two furlongs.—Enter a tamarisk jungle; a very indifferent field of wheat on the right; a flock of sheep seen grazing.

Two miles and six furlongs.—Cross a dry canal. A well of good water with a wheel worked by bullocks, the water is not very plentiful, but it produces a little cultivation; steps are made to descend into the well, and considerable care appears to have been bestowed upon it. Some bundles of jowaree seen near the road. The country with low jungle, but presenting no obstructions.

Four miles and two furlongs.—Bed of a river, or canal, covered with coarse grass.

Five miles and six furlongs.—Road up to this over an open plain, but now passes for a short distance through a low jungle, but not thick; low rocky hills immediately on the left.

Six miles and six furlongs.—Enter a low jungle, the road a little cut up, a village about one and a half mile to the right. Country, a plain covered with low jungle.

Seven miles and four furlongs.—Road a good deal cut up here, and through a low tamarisk jungle; soil sandy, but generally hard.

Seven miles and seven furlongs.—Pass a small canal, about four feet deep, and the road then runs along a kind of bund. The country is covered on both sides to a considerable distance with coarse grass. Herds of cattle and several tattoos seen grazing.

Eight miles and one furlong.—Leave the bund and cross a small canal. The road along the bund is by no means good. Country here has the appearance of having been divided into fields, and also of being marshy in wet weather.

Eight miles and two furlongs.—Pass the bed of a river, the banks to the right very steep, bed hard at present; pools of water.

Eight miles and four furlongs.—Village of Googah.

Eight miles and seven furlongs.—A bund across the river.

The village of Googah is of rather respectable appearance, and may contain about 200 houses. The water is obtained from pools in the bed of the river, which are at present about two and a half feet deep. The river at the bund is forty paces wide. Above the bund, there is also a pool, and wells have been dug, but the supply by this means appears by no means plentiful. The water is drawn in several places by wheels, from wells communicating with the river. A field of sugar cane was observed on the banks of the river, and there are some clumps of fine baubul trees. The ground about the village is covered in most places with a low jungle, especially between it and the river. The site of the village is very slightly raised. An oil-mill was seen at work, and between twenty and thirty camels counted in the vicinity. No supplies of grain were procurable, and the coarse grass is the only forage.

From Googah to Garah, commencing at the Bund.

One furlong.—Cross the bed of a canal, about fifteen paces wide, with very steep banks, and the earth heaped up on the sides, making it from ten to fifteen feet deep. There is also a small ditch, and the whole would require a good deal of work to render the road passable for guns.

Five furlongs.—Road good over a level country, partially covered with grass and jungle, low hills about a mile to the left.

Seven furlongs.—A small canal, country to the right covered with coarse grass, upon which herds of cattle were grazing. On the left, a tamarisk jungle, but by no means thick.

One mile and one furlong.—Jungle for a short distance, and road somewhat cut up, but soon becomes hard and good over a level plain, on which low bushes are scattered. Herds of camels, principally females, with young ones, seen grazing.

Three miles.—A canal dry, with a little grass on its banks.

Five miles.—A dry ditch. Road continues hard and good.

Five miles and one furlong.—A dry ditch, road enters a jungle, which requires clearing.

Five miles and four furlongs.—Descend into the dry sandy bed of a river, along which the road runs for about two and half furlongs. A branch joins from the left, in which there is a pool of bad water. The bed of the river is about twenty paces broad. Banks not very steep, but a good deal broken and covered with jungle. On leaving the bed of the river, the road runs for a mile over wreaths of fine loose sand, into which horses sink very much, and which would be almost, not quite, impassable for guns. A few bushes are scattered upon the surface.

Seven miles and seven furlongs.—Road enters a jungle, and is pretty good.

Eight miles.—A small dry canal, road hard and good. Country continues a plain, covered with low jungles.

Eight miles and one furlong.—Descend into the bed of a river, the banks are covered with jungle, which does not however extend far.

Eight miles and five furlongs.—A dry canal, road a little broken, but in general hard and good.

Ten miles and five furlongs.—Dry rocky bed of a torrent flowing from some low hills, on the right. The Garrah creek close on the left, water salt.

Eleven miles and three furlongs.—Road descends into the bed of the creek, and runs along the edge about three furlongs; it then passes through a rocky opening, and approaches the village of Garrah. The country appears quite a desert, sand hills crowned with low jungle, and no appearance of cultivation. During the whole march no travellers of any kind were seen, and the guide apparently left the road of the mission, and took a short cut across the country. Two wells mentioned in Captain Maxfield's route were not seen.

Twelve miles and eleven furlongs.—Garrah contains about 300 houses and fifteen or twenty banyan's shops; gram, bajeree and wheat are procurable, and also forage brought from Muller. The water is supplied from wells within some enclosures, about three furlongs to the right of the village, but is by no means good, five were counted. They are about six feet deep, from two to five feet in diameter, and have about one and a quarter feet of water, consequently could only be sufficient for a very small body of men; no other water could be found in the vicinity. The creek is navigated by small boats; it is nearly dry at low water, but it is said to be ten or fifteen feet deep at high water spring tides. Large boats are now prohibited sailing from Garrah. Kurrachee may be reached by water in two days. The gram and wheat sold in Garrah is said to be brought from Sehwan, it is in itself utterly destitute of all supplies, being situated in a desert.

From Garrah to Peepree River.

One mile.—Dry bed of a river, road hard and good, but winding among hillocks of sand covered with low bushes, some low hills on the right near the road.

Two miles and four furlongs.—Road up to this very good, but is here a little broken; country, sand hills covered with low bushes.

Two miles and seven furlongs.—A slight rise in the country, which is covered with milk bushes, road good.

Three miles and four furlongs.—Bumbhora on the left, about quarter of a mile distant. Bumbhora is a low hill covered with milk bushes, and can hardly be distinguished in coming from Garrah, from the ground

on that side being itself a little raised above the plain. Its appearance is somewhat of this description ; road good, but a little stony ; water is said to be procurable at Bumbhora.

Three miles, and five furlongs.—Milk bush ends here.

Four miles and one furlong.—Pass some low hills and a little tamerisk jungle, open sandy plain on the left, road excellent ; two ruins on the plain to the left.

Five miles and four furlongs.—Road over a firm sandy desert, jungle on the right, dry bed of a river in which water is said to be procurable by digging.

Five miles and five furlongs.—Pools of salt water on the right, road along the edge of undulating ground covered with milk bush.

Six miles.—Road passes over some undulating ground scattered with milk bush and tamarisk, but is hard and good ; saltwater pools to the right.

Six miles and four furlongs.—Low undulating hills upon right of road, and a long narrow patch of swampy looking ground on the left covered with long grass ; road good, low jungle on the left.

Nine miles and four furlongs.—Wattanjee Landhee.—The road up to this runs along what has the appearance of having been a sea beach ; the country to the left being an open plain as far as the eye can reach, covered in some places by low jungle, and on the right, low hills which sink down abruptly to the plain ; the road is in general excellent, except where it is sandy and heavy, across what resembles the mouths of rivers ; of these there are four or five, from 100 to 250 yards across. Wattanjee Landhee is situated in an opening of this kind. The caravanserai is in good repair, and there is a well of good water, ten feet deep and nine in diameter, with two feet of water. It is drawn by a wheel, and there is a small garden. On leaving Landhee, the road crosses some heavy sandy ground, but is afterwards very good.

Twelve miles and one furlong.—Garrah creek on left of the road about eighty yards across, with apparently deep water, is very winding in its course. The road up to this runs across two bays, the hills receding a little, about a quarter of a mile, in the centre of each, in the last they became regular sand cliffs. The road is excellent in the first, but a little cut up in the second. The low hill, Bhader or Shasher, is on the

left, and composes part of a low range. Road now leaves the low ground, and ascends a gentle slope, but is hard and good.

Twelve miles and three furlongs.—Cross a dry nulla, road sandy but good, over an undulating country covered with milk bush, and quite a desert.

Thirteen miles and five furlongs.—Cross a dry nulla with broken banks, country as before.

Fourteen miles and two furlongs.—Sandy bed of a river, ground undulating, road pretty good.

Fourteen miles, and five furlongs.—Peepree river and ruined caravanserai. The river is from thirty to fifty yards wide, banks broken, rocky bed filled with sand, three wells of pretty good water, largest eleven feet deep, four in diameter, with thirteen inches of water. The soil is a stiff sand. The other wells are smaller, one is quite dry; six cattle and four buffaloes seen watering here. Country a complete desert, with scattered milk bushes. No travellers of any kind seen this march, but the road is well defined throughout; a flock of goats seen near Wattangee Landhee.

From Peepree River to Shurabee, a village in the Muller district.

Four furlongs.—Road very much cut up; on the right bank of the Peepree river deep and sandy, country desert, and scattered with milk bush.

Seven furlongs.—Small open plain to the right, country to the left undulating, and covered with milk bush, road hard and good.

Two miles and three furlongs.—Sandy bed of a river about fifty yards wide, left bank much broken by ravines and precipitous, descent very bad, ascent on right bank easy: road up to this good, country desert, scattered with milk bush and low thorns.

Three miles.—Sandy bed of a river, about forty yards wide. Banks precipitous, from ten to fifteen feet high, descent on left bank very bad. A ravine runs on the right bank, for about a furlong on the immediate right of the road. Country desert, undulating, scattered with milk bush, road hard and generally good.

Five miles and seven furlongs.—Sandy bed of a river about thirty yards wide, banks precipitous and broken; road good and hard.

Six miles and two furlongs.—Dry sandy nulla, four yards wide, banks perpendicular, about four feet high.

Six miles and seven furlongs.—Tombs of the Jams on the right, about two miles distant.

Seven miles and one furlong.—Road diverges to the right from that to Hadjee Oomer-ka-Landee, and lose sight of the long extent of flat country, which is seen on the left over the undulating ground bounding the horizon since leaving the Peepree river. Country desert, undulating, and scattered with milk bush.

Seven miles and seven furlongs.—Descend into a vast plain, bounded by lofty mountains in the distance. Country open near, but a good deal of jungle in the distance.

Eight miles.—Hadjhee Oomur-ka-Landhee about a mile to the left.

Eight miles and four furlongs.—A small red tomb to the right.

Eight miles and seven furlongs.—Country a good deal broken, but road hard ; milk bush scattered about the Mulleer river. About 150 yards to the right, abundance of good water in pools, bed in other places covered with grass, banks sloping, covered generally with high and thick tamarisk jungle.

Nine miles and four furlongs—River turns to the right, road pretty good, but in places sandy, and cut up. Country an undulating sandy plain, with low bushes scattered about upon it.

Ten miles and one furlong.—Well of good water on the right, about eight feet deep, and supply pretty good ; some little cultivation, open plain to right with jungle in the distance. Country broken, undulating, and covered with milk bush to the left.

Twelve miles and four furlongs.—A small village, with an indifferent well on the right. A little grain procurable, but no forage.

Thirteen miles and seven furlongs.—Village of Shurabee about half a mile to the right of the road, with a small well. Country level, covered with low bushes and some baubul trees, a scanty herbage of coarse grass, affording pasturage for flocks of pretty good sheep. Camels also seen grazing in the vicinity. The village itself is merely a few miserable huts, but there are some attempts at enclosures about it. Grain is procurable in small quantities, and also a little forage. A few travellers were met during this day's march.

From Shurabee to Kurrachee.

One mile and one furlong.—Jungle pretty thick, road sandy, and cut up into deep ruts; coarse grass among the jungle.

Two miles and four furlongs.—Bed of Mulleer river, water procurable by digging to the depth of a few feet, bed 250 yards wide, deep and sandy, banks sloping, descent on left bank very deep, and heavy. Road runs through a thick belt of jungle on the right bank.

Three miles and four furlongs.—Bed of a river, hard and sandy, banks sloping covered with jungle, and a good deal cut up.

Four miles.—Bed of a river with low banks, jungle opens.

Four miles and five furlongs.—Bed of a river about 300 yards wide, of deep sand, banks easy, and sloping. Country becomes more open and undulating; road hard and good.

Five miles and five furlongs.—A precipitous bank on the immediate right of the road, for about a mile; road hard and good.

Seven miles and one furlong.—Road enters upon Kurrachee plain, after passing over a range of rising ground, with steep hills; but of no very great elevation. Road hard and good; some tombs upon the left. Kurrachee, Mumora fort, and the rocky islands at the mouth of the harbour come into sight at this point.

Nine miles and one furlong.—Fuqueer's tank near the town of Kurrachee, road over a level plain, hard and good. No cultivation seen during this march, and no travellers. Kurrachee is a large town, stated to contain about 14,000 inhabitants, (Lieut. Carless' report,) and is surrounded by a mud wall, with towers, which is, however, now in ruins. A few old guns are still visible. The suburbs are extensive, water by no means very abundant. The Fuqueer's tank is nearly dry, and the water used by the inhabitants is procured from wells dug in the bed of the Lyaree river. These are in general about four or five feet deep, and appear to be temporary, but one was observed built up in the middle of the river, and there are others near the banks, for the use of the gardens, which appear to be pretty well kept up; no cattle were seen near the town, and it is said that few or no horses are kept; grain is pretty abundant, brought from Upper Sinde; but at present very dear. Forage is extremely scarce, and dear. The general communication appears to be by camels direct

to Hydrabad. Mumora fort, commanding the mouth of the harbour, is about five miles distant, in a straight line, and a long detour is necessary to reach it by land. The usual garrison of Kurrachee is stated to be from 100 to 200 men. The whole of this part of the country is now suffering from two years' want of rain, which has converted it into little better than a desert. In general, the country about Kurrachee and in the Mulleer district abounds in water and fine grass. Mumora fort is supplied with water from the town.

Kurrachee to Ghor-ka-Landhee.

Two miles and two furlongs.—Begins to ascend a gentle slope to the ridge of elevated ground, tombs on the immediate right.

Two miles and four furlongs.—A steep rocky hill on right.

Two miles and seven furlongs.—A steep rocky hill on left, road pretty good, but stony.

Three miles and three furlongs.—Some deep heavy sand, road then becomes pretty good, country level, scattered with bushes.

Three miles and five furlongs.—Pass what appears to be the bed of a river, banks very low.

Four miles and one furlong.—River about 150 yards wide. Pools of salt water, a foot deep, banks easy and sloping, bed hard, road before laid among low hillocks.

Four miles and three furlongs.—Road still bad, among low hillocks, bed of a river about 150 yards wide.

Four miles and five furlongs.—Bed of a river about 120 yards broad, of deep heavy sand, left bank broken, and precipitous, road still bad.

Five miles and one furlong.—Mulleer river two furlongs broad, bed deep and sandy, banks easy, scattered with jungle.

Six miles and four furlongs.—Pass through some jungle, road heavy and bad, among small hillocks.

Eight miles.—Road becomes good.

Nine miles and four furlongs.—Ghor-ka-Landhee, country during this march a plain, after leaving the ridge of elevated ground quite barren, and scattered with a little jungle. There is a small well of very indifferent water near the Landhee. The country here is covered with low bushes, and a little coarse grass is seen, but no appearance of cultivation.

Ghor-ka-Landhee to the Peepree River.

Two miles and six furlongs.—Open plain on both sides, of considerable extent.

Five miles, and four furlongs.—Hadjee Oomur-ka-Landhee. A well about sixty feet deep, cut through sandstone, with a sloping descent, and steps into it, eight feet in diameter, and one foot and a half of green looking water.

Seven miles.—Enter the other road. The road is in general good, but in some few places, sandy and heavy. The country is level, scattered with milk bush, quite desert, and no appearance of cultivation.

Thirteen miles and five furlongs.—Peepree river, and ruins of Landhee.

General Report.

The general direction of Kurrachee from Tatta, is about W. $\frac{1}{2}$ N., and the distance fifty-eight and half miles, nearly, by the perambulator, from the top of the hill above camp to the Fuqueer's tank, at the former place. The road itself presents no obstructions which could not be easily removed, except being in several places deep and heavy from sand.

The country, with the exception of that about Googah, and in the vicinity of the Mulleer river, is at present little better than a perfect desert; at these places there is the appearance of a little cultivation.

The scarcity of water is so great at present, that this route is impassable for troops, except in small detachments of from 100 to 200 men. There is a good supply at the Mulleer river, and at Googah, $35\frac{1}{2}$ miles distant from each other; but at the Peepree river and Garah, it is both very scarce and bad. Kurrachee itself is by no means particularly well supplied, and additional wells would be required, were any force to be stationed there.

Grain is procurable, but in no great quantity, at Garah, and of course at Kurrachee; but it would be unsafe to depend upon that place, even for any in considerable supply.

Dry forage is procurable in small quantity at Garah and Kurrachee; but not equal to the consumption of even a small body of cavalry; what may be procured from villages near the road is altogether

ther insignificant. About the Mulleer river and at Googah, a considerable quantity of coarse grass might be procured by grass-cutters.

Fuel appears to be abundant.

Several flocks of sheep and goats were seen near the road; camels are abundant.

To render the route practicable at present, it would be necessary to dig wells at the Peepree river and Garah, and even then it is impossible to say what supply can be procured till the experiment is tried on a pretty extensive scale; water is certainly procurable by digging in the beds of the rivers, but it is necessary to go to the depth of from five to ten feet. The Mulleer river near Kurrachee is the only point where water was seen within two feet of the surface.

Landhee also appears a favourable place for wells, but does not give marches of such convenient length, as the Peepree River and Garah. Should a supply be abundant at these places, the marches would be

		<i>Miles. Furlongs.</i>	
Kurrachee to Mulleer River,	14	1	
„ Peepree ditto,	8	7	
„ Garah ditto,	14	5	
„ Googah ditto,	12	0	
„ Camp ditto,	8	7	
Total,	58	4	

In considering the communication between Tatta and Kurrachee, the Garah creek should certainly not be overlooked, as although very winding, it affords carriage by water to within twenty miles of camp. Boats of from twenty to thirty candies are said to be able to go as far as Garah, and the water at Bumbhora to be sufficiently deep for vessels of much greater burden. At this last place, are the remains of wells filled up, and it is not impossible that it might be found to be an eligible situation for depôts of provisions, &c. should this route become of importance. The investigation of this point, however, can be satisfactorily carried on by means of boats only.

The whole of this part of the country is said to be at present suffering from a want of rain for two years. Without being acquainted with the actual change produced by a favourable season, it is impossible to say exactly, in what degree the communication would be facili-

tated with regard to supplies, or impeded by the rivers, canals, or standing pools; many of the former, from the state of their banks, appear to be, for a longer or shorter period, the channels of rapid torrents; and the country in several places has the appearance of being under water, or very swampy, during some time of the year.

In addition to the unfavourable circumstances with regard to the want of rain under which this route is at present seen, may be added the evident want of exertion on the part of the inhabitants to put the supplies which the country does afford, at the disposal of any part of the British Army.

(Signed) A. C. PEAT, *Captain,*
Bombay Engineers.

Report on the Road from Sinde, from Subzul to Shikarpoor. By
Mr. Nock.

1. Surwae, the last stage in Bhawal Khan's country, is a small village, in which is the tomb of Nawab Moosa Khan, direction N. E. 80°, distance eight miles from Subzul-kote, and the road leads through slight jungle, a nulla about half way with a wooden bridge, and a village, the frontier of Sinde.

2. Subzul-kote is a pretty large place, having a good bazar, and many wells, out of the town, of good water; to the North, is the dund or lake, which is fast drying up; the spot chosen for the encamping place, is among some ground broken by the plough, S. E. of the town, in the neighbourhood of wells, and a small jungle, which can soon be cleared.

3. Oobowrah is about thirteen miles distant from Subzul, due W.; the encamping ground lies N. E. and S. E., the same spot where the Shah encamped on his way to Shikarpoor. There are three good wells about the vicinity, known by a date tree near the lake, and one of them undergoing repairs; on the other side, in a grove of large tamarisk trees, another well, and in a plantation, marked by a few plum trees, (Ber,) one well independent of the wells in the village, and the nulla

over which the pukka bridge is built, which is going to decay, contains water all the year round, and teems with fish. The road to be traversed is inundated ground when the overflow of the river Indus takes place; at present dry, and considered a good road, with the exception of a slight jungle. Oobowrah, distance from Subzul, is about thirteen miles.

4. From Oobowrah, next stage is Bagoodra. The road on the first onset, is over bogs of mud and water, and over a nulla with a wooden bridge; the jungle runs from here about a mile distant, after which a good road until about half mile near the village of Mammadpoor; before reaching this, you pass a lake and the villages of Rajunpoor and Sooe to the left, distance about three-quarters of a mile from the road, and Tig one mile, also a garden and well. Leaving Mammadpoor you meet the small village of Koraeen and the Muswae drain running on to Meerpoor, and on reaching Bagoodra a nulla is crossed; distance from Oobowrah thirteen miles. The encamping ground is on the South of the village, having the command of five good wells of water: here the Shah once encamped.

5. Surhad is about nine miles distance from Bagoodra, and after leaving a jungle runs for about, then a good space for about one mile until Tutta Malna, after which a slight jungle until reaching the drain, when a pretty thick one commences to near the village. A well and a few habitations of shepherds, with the village of Janpoor, is seen to the right. A good encamping ground, with more than nine wells in the neighbourhood. Shah Shooja encamped here.

6. Gotkee from Surhad is about nine miles, a pretty good road almost all the way; about the midway, is a canal thirty feet broad, but no great obstacle, and perfectly dry; there are also two small drains to be passed before reaching Gotkee.

7. From Gotkee to the next stage is Dadoola, distance about thirteen miles, direction S. W. 70° , passing three villages, Bammoowala, Bhisttee and Malloodee; all the way a slight jungle, which can soon be cleared with a little trouble. The encamping ground is on the North side of the village, having the use of three wells on the lands. This part of the country is well peopled, and cultivation is getting on prosperously; passing Bhelar is a drain, which should be avoided. By trending on the East side, the road is much freer from jungle, direction

S. W. 64° ; this village is situated on the dund, and deep water, which runs on to Azeezpoor and Hoosein Belee. The encamping ground had better be on the bank of the dund, which is about ten, twelve, and fourteen feet high; the road leads on the bank, and over jungle, and in one place over a cotton field on to Azeezpoor, which is also near the river, but the ferry commonly known by the name of Azeezpoor-ka-Pattan, is at the village of Hoosein Belee. Azeezpoor from Chooga is about four miles distant.

9. The next halting place is Hoosein Belee, at the ferry. After crossing a deserted dund, completely dry at the road, and some small jungle, there are two streams at the present ferry; one, the dund, about 150 feet broad, with two, three and four feet water, the last is an extensive one; two boats ply here, one on each stream, and people land on the Bet, or island, having to go about one and a half mile, when they again embark and land on the other side. The two ferries made here are a matter of choice of the boatmen to save themselves the trouble of plying to a long distance; for there is a good ferry higher up where the army should cross.

10. The Indus on the western bank contains water twelve, sixteen, and eighteen feet, and at the centre stream more than thirty and forty feet deep, with a strong running current. Near the Bet (an island,) ten, twelve and eight feet water, and on the East bank four, six and eight feet water. There are two villages situated on the northern bank of the river, named Syud Ameer Mohamed and Phoolooda Ghat, crossing the ferry. The place of encampment pitched on is at the village of Ghat Awril, about a mile from the river, and in a fine plain; the river water is used here, and there is but one small temporary well.

11. From Ghat Awril, taking a direction N. W. 80° , about a mile on the road, is the small village of Mota Mar, and then about half a mile further is a good drain, over which is a temporary bridge, all sheltered; horsemen are obliged to keep to the left, and pass the drain, taking the same direction; and leaving Rubban and Eajmut to the left, the latter a comfortable village, you pass a small jungle on to Koriee, where is the encamping ground of the army on the south of the village; the difficulty here to be experienced is from the well water, which is not good.

12. Leaving Kae, the direction varies to N. W. 60°, distance from Ghat Awril to this place is little more than twelve miles. Shikarpoor is the next stage, before coming to which you pass through a good path, road on both sides free from jungle, and after reaching Lubauna, you pass the Sinda canal. Lubauna is a village under Meer Aly Moorad, and to appearance the inhabitants are in a comfortable way; patches of cultivation mark the road on. to Shikarpoor. Distance from Kae nearly twelve miles.

(Signed) J. NOCK.

(True Copy,)

(Signed) ALEX. BURNS,
Envoy to Kelat.

Proceedings of the Asiatic Society.

(Friday Evening, 13th January, 1843.)

The Annual Meeting of the Society was held on Friday evening the 13th January, the Hon'ble the President in the Chair.

The following Gentlemen were proposed as Members of the Society :—

The Rev. CHARLES IRVINE, St. Xavier's College. Proposed by the Hon'ble Sir H. SETON, seconded by H. TORRENS, Esq.

Lieut. BAIRD SMITH, Bengal Engineers. Proposed by H. TORRENS, Esq, seconded by Lieut. A. BROOME, B. A.

BABOO COSSINATH BHOSE. Proposed by Dewan RAM COMUL SEN, seconded by Baboo PROSSONO COMAR TAGORE.

JOSEPH ST. POURCAIN, Esq. Chandernagore. Proposed by Dr. WISE, seconded by the Acting Secretary.

Library.

The following list of Books, presented and purchased, was read :—

Books received for the Library of the Asiatic Society, for the Meeting of the 13th January, 1843.

The Calcutta Literary Gleaner, for January 1843. Vol. I, Nos. 9 and 11, from the Editor.

The Calcutta Christian Observer, for January 1843. New Series, Vol. IV, No. 37, from the Editor.

Oriental Christian Spectator, 2d Series. Bombay, November 1842. Vol. III, No. 11, from the Editor.

Journal des Savants, Juillet 1842. Paris.

Annals and Magazine of Natural History. London, September 1842. No. 62. Purchased.

London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science, 3d Series. Vol. 21, No. 136, August, 1842.

Transactions of the Society of Arts, &c. London, 1841. Vol. LIII, Part 2d.

Proceedings of the Geological Society of London, 1840-41. Vol. III, Part II, Nos. 72 to 76.

Yarrell's History of British Birds. London, 1842, Part 31. Purchased.

Chinese secret Tried Society of the Tien-ti-Hi-uh, by Lieut. Newbold and Major General Wilson. Presented.

Stevenson's Translation of the Sanhita of the Samadeva. London, 1842.

Iben Khallikan's Biographical Dictionary, translated from the Arabic, by Bn. Mac-Gluckin de Slane. Paris, 1842. Vol. I. from the Author.

Archæologia, or Miscellaneous Tracts relating to Antiquities. London, 1842. Vol. XXIX. from the Archæological Society.

Meteorological Register kept at the Surveyor General's Office, Calcutta, for the month of November 1842, from Government.

Read the following letters from Government.

No. 1184.

TO H. TORRENS, ESQ.

Secretary to the Asiatic Society.

General Department.

SIR,—In continuation of the previous correspondence respecting the proposed publication of Dr. Cantor's Chusan Report in the Researches of the Asiatic Society, I am directed by the Hon'ble the Deputy Governor of Bengal, to transmit to you for the purpose therein mentioned, copy of a further letter from Dr. Cantor, dated the 10th of October last, together with the Manuscript which accompanied it, entitled, "Some account of the Botanical Collections made by Dr. Cantor during his service in China," drawn up by Assistant Surgeon W. Griffith.

I have the honor to be, Sir,

Your most obedient Servant.

H. V. BAYLEY,

Deputy Secretary to the Government of Bengal.

Fort William, the 14th December, 1842.

TO G. A. BUSHBY, ESQ.

Secretary to the Government of Bengal.

SIR,—I have the honor to submit the accompanying Manuscript, entitled, "Some account of the Botanical Collection made by Dr. Cantor, during his service in China," drawn up by Mr. W. Griffith, who on receiving a series of duplicates of the botanical collections formed for Government during my service in China, promised to undertake the task now performed.

2. As the contents of Mr. Griffith's Manuscript are illustrative of the Descriptive Catalogue of Animals, collected at Chusan, which I had the honor to draw up by order of the Right Hon'ble the late Governor General, it would be desirable that both should be published in conjunction.

3. As you have been pleased to present my Manuscript to the Asiatic Society, I have the honor to solicit that you will favor me by presenting Mr. Griffith's Manuscript to the Asiatic Society, with a view, that it may appear in the same volume of the Society's Researches, in which my Manuscript is to be printed.

4. Mr. Griffith has offered to correct the press when he shall have arrived in Calcutta.

5. Finally, I beg to apologize for the unavoidable delay which has taken place in the transmission of the accompanying Manuscript.

I have the honor to be, &c.

(Signed) T. CANTOR,

P. W. Island, the 10th October, 1842.

Assistant Presy. Surgeon.

(True Copy.)

H. V. BAYLEY,

Deputy Secretary to the Government of Bengal.

Ordered—That the thanks of the Society be returned to Government, and that the MSS. be published in the Transactions.

No. 317 of 1842.

From G. A. BUSHBY, Esq. Officiating Secretary to the Government of India, to H. TORRENS, Esq, Secretary to the Asiatic Society. Fort William, the 7th December, 1842.

Political Department.

SIR,—I am directed by His Honor the President in Council to forward to you for submission to the Asiatic Society, the accompanying Fac Simile of an Ancient Inscription recently discovered in Aden, by work people employed in excavating a new road, together with transcript of a letter from the Political Agent at Aden to the Secretary to the Bombay Government, forwarding the same, with his observations.

I have the honor to be, Sir,

Your most obedient Servant,

Fort William, the 7th December, 1842.

G. A. BUSHBY,

Officiating Secretary to the Government of India.

Ordered—That the letters be duly acknowledged, and that Captain HAYNES' letter with a lithograph of the Inscription be referred to the Secretary for early publication in the Journal.

Read extracts from private letters of Major TROYER to Mr. TORRENS and to Baboo RAM COMUL SEN, enquiring as to the transcription of the Vedas for the French Government. The Hon'ble the President stated that this had been a private account between the late Mr. JAS. PRINSEP and the French Government, and that on the retirement of M. GUIZOT from office, the allowance of 1500 francs annually had been stopped; that the accounts had been duly rendered; and that there was even a small balance due. Upon enquiry of KAMALAKANTA PUNDIT, who had conducted the Benares correspondence, he stated, that about "seven anas" 7-16ths were copied and sent, and that the remainder 9-16ths could be obtained whenever cash

arrangements were duly made.* The Acting Secretary was requested to communicate officially with Major TROYER, on the subject of his letter, after making due enquiries.

Read the following letter from T. S. STOPFORD, Esq. accompanying the handsome Donation to which it refers, and for which the best thanks of the Society were voted, for his polite attention in supplying this blank in the Museum.

Chandpore, Diamond Harbour Road, 2nd January, 1843.

MY DEAR SIR,—Mr. Higginson tells me, that the Asiatic Society is in want of a good specimen of a *Wild Boar*.

By the bearers I send one I killed yesterday, than which I have seldom seen a finer. He was a famous one too, having been hunted last year several times by the "Tent Club," without success, and became the terror of the villages about this place.

If it could be stuffed, it would be better than a *skeleton*, and ticket it, "Presented to the Asiatic Society's Museum in behalf of the "Tent Club," and killed by J. S. Stopford, 2nd January, 1843."

I remain, Dear Sir,

Yours truly,

J. S. STOPFORD.

The following list of articles presented to the Society by Lieut. W. S. SHERWILL, 66th Regt. N. I. Revenue Survey, Gya, was read. They will be found referred to more particularly in the Zoological Curator's report.

List of Specimens presented to the Asiatic Society's Museum. By LIEUTENANT WALTER S. SHERWILL.

One Horn of South African black Rhinoceros. *R. Africanus*.

One ditto, polished.

One pair of Horns of Male Hartebeest. *Damalis Canina*.

One pair of Horns of Male Bontibok. *Gazella Pygarga*.

One Skull of Ethiopian Hog, *Sus Larvatus*, from Port Natal, South Africa.

One lower Jaw of Hippopotamus.

One pair of Horns of Roe Rhiebok, *Redunca Villosa*.

Two Tusks from lower Jaw of Hippopotamus, (*S. Africanus*.)

One strip of Hide from Hippopotamus, of which are manufactured the Cape "Samboks," or Whips.

Two Tusks of Hippopotamus, (lower jaw.)

Two lower projecting circular Tusks or Rooters of the same animal and individual; killed at Port Natal.

One Skull of Hyrax, or Rock Rabbit, from the summit of the Spitzkopf Mountain, the highest peak in S. Africa, height 10,250 feet above the sea, which is seen to the south at the distance of 126 miles.

Two Wooden Spoons of Hoolu manufactory. Tribe of King Moselekatse.

One Horn of Springbok, *Gazella Euchore*.

* Major Troyer's letters also stated, that the Societé Asiatique had not yet received the 4th Vol. of the Mahabarata though dispatched long ago.

Two odd Horns of Blesbok, *Damalis Canna*.

One single Horn of a Cow Eland or Impoofoo, *Damalis Oreas*. Bull stands six feet six inches high at the shoulder.

Six Poisoned Arrows of Bushman manufacture, made of reeds, tipped with bone from the Ostrich thigh bone, inserted in a piece of strong wood, and bound with the dorsal sinew of the Springbok Antelope. The poison is composed of a species of red slime or moss, called by the Dutch "klip gift," or "rock poison." It is common to all waterfalls and damp spots in the snowy mountains in South Africa; this ingredient mixed with the poison from the poison-fangs of the Cobra-de-Capello and the inspissated juice of a bulb named by the Dutch "telp," resembling a crocus with a blue flower, forms a mass which is smeared on the shaft and bound with sinew. The effects of this poison are sudden, and very fatal.

Three Tails of Cameleopards, *C. Australis*.

6th November, 1842.

The grateful thanks of the Society were ordered for this handsome Donation, of which many of the objects excited great admiration, and are most valuable additions to the Museum.

Read the following extract of a letter from Lieut. BAIRD SMITH, referring to his former enquiry as noticed in the Proceedings of (See November or December Proceedings.)

Camp Delhi, 11th December, 1842.

MY DEAR SIR,—Accept my best thanks for the trouble you have taken in forwarding to me the extract from the Papers, relative to the Earthquake of the 11th ultimo, and those in Persian &c. relative to Earthquakes in general. Both are most acceptable, and you will oblige me by thanking Mr. Torrens in my name for the latter.

There is no doubt whatever as to the existence of the Zill Zillee Namah, and that portion of the Calcutta native *savans* who doubt of this, because not themselves aware of it, have fallen into the not unusual error of reducing the information of others to the standard of their own ignorance. Dr. Falconer has repeatedly seen and examined it during his travels in Cashmeer, and by a note just received I learn, that although a copy of it cannot be procured in Delhi, many of the learned natives there are acquainted with the work. I fear, however, that it is from Cashmeer only that it is to be procured, and I have sought the aid of Mr. George Clerk in procuring it thence.

Very sincerely yours,

R. BAIRD SMITH.

Read the following letter from the Curator in the Zoological Department:—

Asiatic Society's Museum, 13th December, 1842.

SIR,—I beg to represent to you the urgent necessity that exists for not longer delaying to supply cases for our rapidly increasing collection of stuffed Mammalia.

Of the many specimens that are now risking the consequences of exposure, I find that two have already suffered from insect ravages. Fortunately, these chance not to be of value (further than as regards the time expended on the preparation of them), being merely a Jackal and a common Fox; but the same injury might have happened to species which are not so easily replaced, and which are still liable to be thus attacked and ruined.

It is moreover injurious to such of our specimens as are under cover, to crowd them one upon another, as I have hitherto been obliged to do, to bring as many of them as possible within the protection of the two small glazed cases which alone can now be allotted to them; and the proper display of our collection of Mammalia to visitors is altogether impracticable under existing circumstances.

I may also be permitted to add, that it is evidently felt as discouraging by our taxidermists, that the specimens upon which they have bestowed so much pains in getting up, should be suffered to receive injury for want of the needful protection of glazed cases.

It is now some months since the admeasurements were taken for two large cases, such as would amply supply our present wants, to be placed outside the Society's meeting-room, and opposite each branch of the staircase; but I have understood that the order for these has been, for the present, countermanded; and in the mean while it devolves on me to remind you that the perishable specimens intended to fill them are in constant jeopardy, certain of them having already suffered injury as hereinbefore mentioned.

Yours obediently,

ED. BLYTH.

Ordered—That the estimate be prepared, and referred to the Committee of Papers for approval.

Read note from R. C. GATFIELD, Esq. presenting Bows and Arrows used by the Hill people about Rajmahl, for which the thanks of the Society were ordered.

Read letter from MR. JAS. DEARDEN, Serampore, for whose curious Donation the thanks of the Society were voted.

To the Secretary of the Asiatic Society.

SIR,—If the enclosed Nest or Bag, * which I found on a tree in the Garden of the late Dr. Carey, at Serampore, be deemed by you worthy of preservation, I beg your acceptance of it for deposition among the Society's collection of curiosities. It contained at the time of finding, two or three solitary, common red Ants, (these I imagine, were not the framers) and was disposed between two unfaded leaves which were firmly united round the edges by some adhesive matter, and so compressed, that they expanded at the centre, taking the form of a mango fruit stone. The opening was at the tips of the leaves. During the last six years, I have never observed any change in it.

I remain, Sir,

Serampore, 28th December, 1842.

Yours obediently,

JAS. DEARDEN.

Read the following letter from Major BOILEAU, of the Magnetic Observatory, Simla:—

Simla, 8th December, 1842.

MY DEAR SIR,—I have the pleasure of sending, through my brother, two more Sets of Tables, one a transformation of Mr. Oltmann's Barometrical Tables, which will be very useful, in enabling the labourers in this department of Physics to reduce all these

NOTE.—This Nest was probably the production of a silk weaving spider, but nothing farther could be ascertained.—ED.

observations by one common method; and, secondly, a very convenient and portable set of Refraction Tables, which I have extended and enlarged from those printed in the Philosophical Transactions, for 1838. Portable Tables of this kind are still much wanted, and as Mr. Baily has given these (on a small scale and before the publication of Mr. Ivory's second paper, which introduces certain corrections in the former numbers,) they may be looked upon as filling up another desideratum for the Travelling Observer's library.

I remain,

My Dear Sir,

Yours very truly,

J. H. BOILEAU.

The best thanks of the Society were voted for these valuable fruits of Major BOILEAU's labours, and the papers were referred to the Editor of the Journal for publication.

Read a translation of ten Sanscrit Slokas, composed by KAMALAKANTA PUNDIT, on the restoration of the Gates of Somnath.

Read the Report of the Curator of the Museum of Economic Geology for the month of December.

Report of the Curator Museum of Economic Geology for the month of December.

Museum of Economic Geology.—The following letter from the Right Honourable the Board of Control has been transmitted to us by the Private Secretary, from the Right Honourable the Governor General. It is in reply to the circulars of this department addressed to the Board by our Secretary.

Camp Korna, November 30th, 1842.

SIR,—I am directed by the Governor General to transmit the accompanying letter.

I have the honor to be, Sir,

Your most faithfully,

H. M. DURAND, *Lieut. Private Secretary.*

The Secretary of the Bengal Asiatic Society.

India Board, 16th September, 1842.

SIR,—I am directed by the Commissioners for the Affairs of India to acknowledge the receipt of your letter of the 4th July last, forwarding a Prospectus of a Museum of Economic Geology, which has been established at Calcutta, in connection with the Bengal Asiatic Society. The Board are fully sensible of the advantages that may result from the researches of this Society, not only to the Scientific, but also to the Agricultural and Commercial portions of the community, and I am desired to assure you, that it will give them much pleasure to favor the attainment of the objects which it has in view.

I am, Sir,

Your most obedient humble servant,

W. B. BARING.

The Secretary of the Bengal Asiatic Society.

I have the pleasure to state, that we have recovered, through the agency of Major Manson, Political Agent with Bajee Rao at Bithour, four cases of Minerals and Geological specimens, shells, models of crystals, &c. and one Chemical Balance with a Nicolson's Gravimeter, and a small box of blowpipe tests, &c. These, as I learned from

Captain Herbert's Journal, had been made over to his survey from Captain Dangerfield's, and it at last occurred to me to address Major Manson in my search after them. A part, it appears, were sent down to the late Mr. J. Prinsep, but the remainder have now reached us. The specimens are in a sad state of confusion, but I recognise several referred to in Captain Herbert's Journals, and there are many which will either fill up blanks, or be very illustrative and useful in our collections. The apparatus also is in a dilapidated state, but can be repaired, and will all be of service in the laboratory.

Lieut. Yule, of the Engineers, Executive Officer at Chirra Punjee, has at my request obliged us with four bags of the Fire Clay of that locality, to which I propose giving a trial in the construction of the furnaces of the laboratory; a specimen is upon the table. Mr. Mornay, Civil Engineer, from whom we purchased the Minerals noted below, has presented us with a small, but highly interesting and instructive set of fifteen specimens from the Coal field of Burdwan, consisting of the coal, porphyry, dykes in contact with the coal, and petrifications.—I may notice amongst these last, a splendid specimen of the top of a tree Fern, No. 15, which is now on the table, and No. 4, an instance of coal altered to mineral charcoal, by the agency of a dyke of trachyte. This is not uncommon, but we had no Indian specimens of it hitherto.

I have also to report from this department a first dispatch of specimens to the Honourable the Court of Directors through the Government of India, consisting of a part of Captain Tremenheere's Tin Ores and Matrix from Kahun, Porcelain and Fire Clays, Ores of Manganese and Antimony and Iron, in all 21 specimens.*

Mineralogical and Geological.—Mr J. Pontet, Deputy Collector of Bhaugulpore, has sent us a box of various specimens, principally geological, but his list of localities has not yet been received. He has been good enough to promise us further supplies, and as he is known to be a most active searcher amongst the Coal fields of that district, we shall doubtless profit greatly by his kind assistance.

From the Rajmahl District.—From C. P. Gatefield, Esq. we have also a small collection of Geological specimens, carving from Peer Pointee, and some stone Cannon Balls from near the Telleaghurry Pass, which he describes as follows: "These Cannon Balls were dug up about a mile from the Telliaghurry Pass, there are 5 or 6 Cannons at this Pass still, and the balls fit these guns; they must have been in use during the Mogul Government. Telliaghurry is situated between Calgong and Sicery."

Having been authorized by the Committee of Papers to endeavour to purchase from Mr. Mornay's Collection such part as would be useful to us, I have done so to the extent allowed, and the Minerals are now upon the table, to the number of 90 Specimens for 120 Rs. Amongst these, I may notice the specimens of Gold Ores from Brazil, as they occur in the various rocks, or with minerals, which are especially instructive for the Museum of Economic Geology. The seven specimens of Diamonds of various Crystallisations, Octohedrite from the Gold Clay, and from Mexico, are remarkable; as are also the specimens of Russian Platina and Platina Sand, and many of the minerals, which are rare, or valuable, on account of their crystallisations.

* The suggestion of Captain Tremenheere, that the Museum should acknowledge its contributions by an engraved letter, in the style of those of the Royal Museum of Economic Geology, having been approved of by the Society, I have now the pleasure to submit, for inspection, some letters prepared from our own steel plate, with a lithographed form added below it.

As the hour was late, and much business yet before the Society, the reading of the report of Dr. ROER, the Librarian, was postponed to the next Meeting.

A note from Dr. T. A. Wise, B. M. S. was read, stating, that as he intended to proceed to Europe viâ Egypt, he should be happy to be the bearer of any books or other articles which the Society might desire to present to Mahommed Ali Pasha. It was ordered that a list of the Arabic works printed by the Society should be sent to the Hon'ble the President for him to direct what might be most acceptable.

The Hon'ble the President referring to the great loss the Society would sustain by the loss of the services of their talented Secretary, Mr. H. TORRENS, in that office, desired the following letter to be read:—

H. PIDDINGTON, Esq.

Joint Curator Asiatic Society of Bengal.

SIR,—I beg urgently to request that you will have the kindness to relieve me, pending the ulterior arrangements to be determined by the Asiatic Society, of the current duties of the Secretariat Office.

There is I beg to state no duty among them, with the exception of the collation of certain MSS. of the "Tareekh-i-Nadiree," (now under preparation for the Press,) which requires a degree of attention, which you might find it inconvenient to give.

I beg that you will state to the Hon'ble the President, that this work is nearly completed, and that I will carefully go through the MSS. before laying it before him.

The financial responsibilities of the Secretary will of course rest with me, until I am formally relieved from them.

Under these circumstances, I trust that you may not find it impossible to accede to my request, in which case I shall beg you to lay before the Hon'ble the President the accompanying letter of resignation.

I have the honor to be, Sir,

Your very faithful servant,

H. TORRENS.

TO THE HON'BLE H. T. PRINSEP, Esq.

President Asiatic Society of Bengal.

HON'BLE SIR,

Having performed to the best of my ability the duties of the Secretariat Office of our Society for about three years, I now feel myself under the necessity of resigning them, principally by reason of their being now too heavy to enable me to perform them with benefit to the Society.

You are aware that other causes of a public nature operate to confirm me in this step.

During the period of my holding office, I have addressed no Annual Report to the Society of what has been done in the several branches of science in which its Members, and the scientific public of India, are interested. I was diffident upon the point of ranking myself, in a published report, among those whose real attainments give them a personal right to review and discuss the proceedings of the philosopher, the antiquary, and the naturalist.

I need not revert to the period when sudden illness deprived the Society of the invaluable services of your esteemed and lamented brother, James Prinsep, as that in which the interests of the Society were more deeply affected to their detriment, than had perhaps ever before been the case.

He was taken from the active pursuit of his literary and scientific researches, without the opportunity of giving to his successor the means of arranging what was left necessarily in confusion by his sudden prostration, throughout all the departments of science and details.

Professor O'Shaughnessy, who undertook the duties of Secretary, though harassed by unceasing labour, both in the laboratory and the lecture room, was aided in the Oriental Department by Mr. Sutherland, than whom none could be more capable for such duty. He too was, however, as heavily charged with public work, as was the Professor.

It was at the instance of these gentlemen, and more specially of our late President, Sir Edward Ryan, that I consented to undertake the duties of Secretary.

Since that time, the Society has been able to avail itself of the services of two gentlemen as Curators of the Museum, Mr. H. Piddington and Mr. Blyth, and of those of Dr. Roer, as Librarian.

Whatever has been done, has been effected through their agency. I refer you, Sir, to their reports, to the present state of our Museum and our Library, in proof of the good fortune upon which the Society may congratulate itself, in that their effectual services were able to supply deficiencies in another quarter.

To Mr. Piddington, I owe a personal debt of gratitude for much gratuitous labour, by which he has either relieved or assisted me, when public duty or personal incompetency rendered me unequal to the calls which were made on my time, or my qualifications for the post I held.

You are aware, Sir, that I have conducted the publication, called the "Journal of the Asiatic Society" on the same understanding, as did James Prinsep; viz. at my personal risk, though supported by the Society in the matter of subscription at a certain rate for each copy furnished to a Member. I propose to complete the twelve numbers due for the current year, and then to give up the Editorship. Whether it may be expedient that the Society should make the Journal its own, will be a question, Sir, for your future consideration.

In the important matter of our finances, the Society have I trust been fully satisfied, that in spite of a most liberal expenditure, our assets have accumulated.

I must, however, request that you will name a Committee to audit my accounts, and give me a final acquittal of responsibility.

I now, Sir, resign to you my appointment as Honorary Secretary, the duties whereof have been temporarily assumed by my friend, Mr. Piddington, at my urgent request, pending ulterior arrangements; and in so doing, I have to thank you, Sir, and the Members of the Society for the support I have received, while I at the same time apologise for no few errors, and many omissions, which the nature of my public onerous and responsible duties, as well as the pressure of other circumstances rendered it most difficult for me to avoid making. I have the honour to be,

Sir,

Your very faithful servant,

H. TORRENS.

P. S.—In emendation of my proposal to have the accounts audited by a special Committee, I beg to submit them herewith for general inspection.

The following resolutions were then unanimously passed on the motion of the Honourable the President, seconded by Sir John Peter Grant.

It is proposed that in acknowledgment of Mr. Torrens' services to the Society, a subscription be entered into for the purpose of presenting him with an appropriate Testimonial.

That an Inkstand appears the fittest Testimonial to select.

Resolved—That the accounts received from the Secretary be approved and passed.

Resolved—That the Society accept the resignation of Mr. Torrens with extreme regret, and offer him their grateful thanks for the services he has rendered to the Society, during his conduct of the important and various duties of the Secretary's office.

Resolved—That in the opinion of this Meeting the Society would not be warranted in recommending to the office of Secretary any person, howsoever qualified by scientific attainments and business habits, who could not also superintend the Oriental Department, and the publications for which funds are furnished to the Society by Government.

That as no person has offered himself competent to superintend both the Sanscrit and Arabic and Persian works now in the press, and proposed for publication, that a temporary arrangement be made until such a competent person can be found.

Resolved—That Mr. Piddington be requested to continue to conduct the duties pending the vacancy of the office.

Resolved—That the Society conduct on its own part the Journal, from the date when it may be given up by Mr. Torrens.

Mr. Piddington signified his sense of the honor conferred upon him, and his readiness to give every assistance to the Society in the conduct of the Secretariat duties.

JOURNAL
OF THE
ASIATIC SOCIETY.

*Documents relating to THE GATES OF SOMNATH; forwarded to the
Society by the Government of India. With Plates.*

*Report of a Committee assembled by Order of Major General NOTT,
to report on the state of the Gates brought from Ghuznee.*

Camp near Peshawur, 8th November, 1842.

Considering the great age of these gates, the probable injury sustained by them in their displacement from the temple of Somnauth, and transport to Ghuznee, the circumstances of their having been taken down and buried during the invasion of Affghanistan by Chenghiz Khan, to preserve them from destruction by the troops of that conqueror, and their subsequent disinterment and re-erection, they must be deemed in good preservation. Great care has been observed in their packing and carriage since their removal from the tomb of Mahmood at Ghuznee, and they do not appear to have sustained any material damage from their transport thus far on their return to India.

The tomb of Mahmood of Ghuznee has been for ages a place of pilgrimage, almost of adoration, to Mahomedans, and the gates objects of especial attention; it is not therefore matter of surprise, that the lower portions of the gates within the reach of a man's hand have suffered greatly; the carved work has in some places disappeared, small portions having probably, from time to time, been abstracted as relics. Here and there pieces of carved wood, perhaps of the same antiquity as the gates brought with them from Somnauth, but dissimilar in pattern, have been used to replace the original carving, and in other places

inferior material and workmanship have been employed to repair the fabric. But the upper portions of the gates still retain much of the original carving, which is in high relief, of beautiful execution, and in a wonderful state of preservation.

The gates appear to have been formerly decorated with plates of some precious metal, fixed to the wood work round the carved compartments by small slips of iron. Many of these slips still remain in regular patterns, over the top of the gates, lower down they have altogether disappeared.

The frames of the gates are in double folds hinged in the centre, their height is eleven feet, and their aggregate width nine and a half feet.

The gates are surrounded by a framing composed of small pieces of carved wood, united by numerous joints in regular pattern. This portion of the work, though of great age, seems of more modern and slighter manufacture than the gates themselves. The exterior dimensions of their framing, (now in four separate portions,) are sixteen and a half feet in height, thirteen and a half in width. The framing is in very fair preservation, excepting near the ground, where seats seem to have existed on either side the gateway, and the portions of the framing in this position, to the height of a man's shoulders, have been fairly rubbed away. The construction of their framing, and the numerous joints of the work render it peculiarly liable to damage from travelling over rough roads, or from frequent removal.

We are of opinion, that it will not be difficult to restore all essential portions of the gates that are now wanting, and to fix them in serviceable condition in any building destined to their reception; but some judgment would be required to make any repair or restoration harmonious with the air of extreme antiquity possessed by the original portions of the gates.

In consonance with the Major General's request, we have the honor to forward herewith sketches of the gates, with the dimensions accurately entered on the face of the drawing.

The Major General having desired the Committee to state their opinion as to the expediency of conveying the gates in a frame adapted to elephant carriage, we beg to state our apprehension, that such a mode of conveyance might be productive of serious injury to them.

The wood is extremely dry and brittle, and the greatest care is requisite to guard against the more delicate portions of the work being even touched. The gates are not heavy; they do not probably exceed 500lb. in weight, and we estimate the entire weight of the gates and framing at less than half a ton; but their surface is great compared with the scantling of the frame-work, and the swaying motion of the elephant, and the necessity that would exist for daily loading and unloading the animal, could scarcely fail to open the joints and dislodge the frailer portions of the work, however carefully secured.

We would therefore respectfully suggest, that a car with a double framing between which the gates should be placed, and to which they should be secured by wedges well padded, measures being taken to prevent the entire weight of the gates falling on any portion of their own frame-work, might be expediently prepared at Ferozepore to receive them, such car being adapted to elephant draft. But the gates alone should, we think, be thus carried, the framing being transported to its destination packed as (with the gates) it is at present in felts and tarpaulins. In any case, we would recommend that on their arrival at Ferozepore, both the gates and framing should be carefully examined, and some strengthening by ties and braces given to the slighter portions, to guard, as far as possible, against the chance of small pieces becoming dislodged, and perhaps lost on the road.

In examining on this occasion the framing surrounding the gates, the Committee observed a Cufic inscription carved in the wood, with a copy and translation of which appended to our report, we have been furnished by Major Rawlinson. We think that it will give an interest to this document, if we attach to it a translation of the inscription on Mahmood's tomb, with which we have been favored by the same distinguished orientalist. Lieut. Studdart has also enabled us to annex a drawing of the sarcophagus, with an exact copy of the Cufic inscription thereon.

(Signed)	EDWD. SANDERS, <i>Major, Eng. and Presdt.</i>
„	C. BLOOD, <i>Capt. Bombay Art. and Mem.</i>
„	JOHN STUDDART, <i>Bombay Eng. and Mem.</i>
„	C. F. NORTH, <i>Lieut. Bombay Eng. and Member.</i>

*Copy and Translation of an Arabic Inscription upon the Gates of Somnath, which have been brought from the tomb of Mahmud of Ghuzni.**

The same rendered in modern Arabic.

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ غُفْرَانَ مِنَ اللَّهِ لِلْأَمِيرِ الْأَجَا السَّيِّدِ الْمَلِكِ
 الْمَوْلِدِ أَمِيرِ الدَّوْلَةِ وَالْمِيرِ الْمَلِكِ أَبُو الْقَاسِمِ مُحَمَّدِ بْنِ سَبَاكْتِغِينَ رَحْمَةً
 اللَّهُ عَلَيْهِ وَلَوْ رَحْمَةً لَهُ

Translation.

In the name of the most merciful God—(may there be) forgiveness from God for the most noble Ameer, the great King (he who was) born to become the Lord of the State and the Lord of Religion, Abil Kasim Mahmood, the Son of Sabaktagin. May the mercy of God be upon him [remaining phrase illegible].

(Signed) J. A. RAWLINSON.

Translation of the Inscription in Cufic Characters on the Sarcophagus of the Tomb of Sultan Mahamud at Ghuzni.

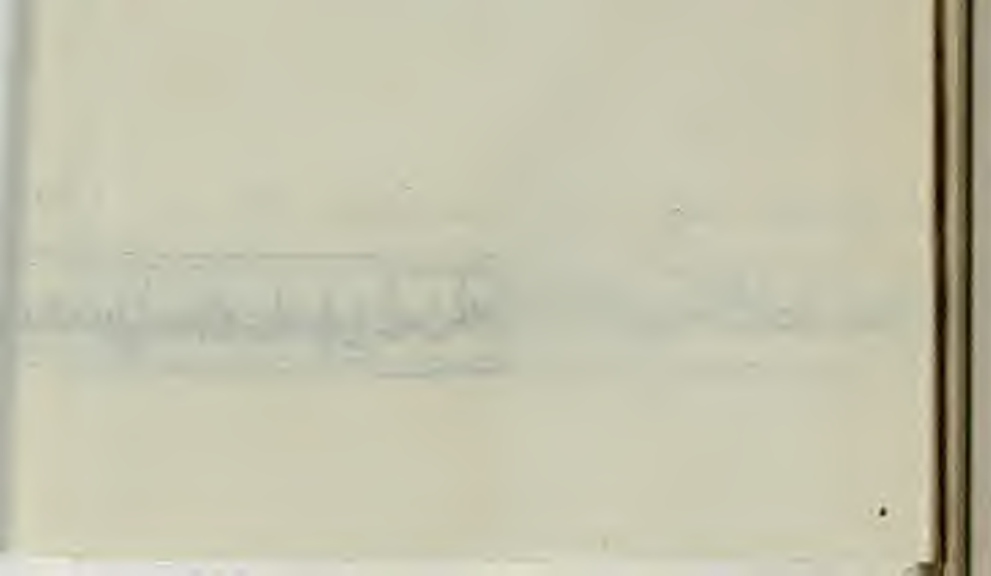
Translation.

May there be forgiveness from God upon him, who is the great Lord, the noble Nizam-ud-din Abul Kasim Mahmúd, the son of Sabaktagin. May God have mercy upon him.

Mem.—On the reverse of the Sarcophagus, there is an inscription in the Neskha character, recording the date of the decease of Sultan Mahmúd, as Thursday, the 7th remaining day (*i. e.* the 22d or 23d) of the month of Rabi'el Akhir, A. H. 421.

(Signed) J. A. RAWLINSON.

* See lithograph.

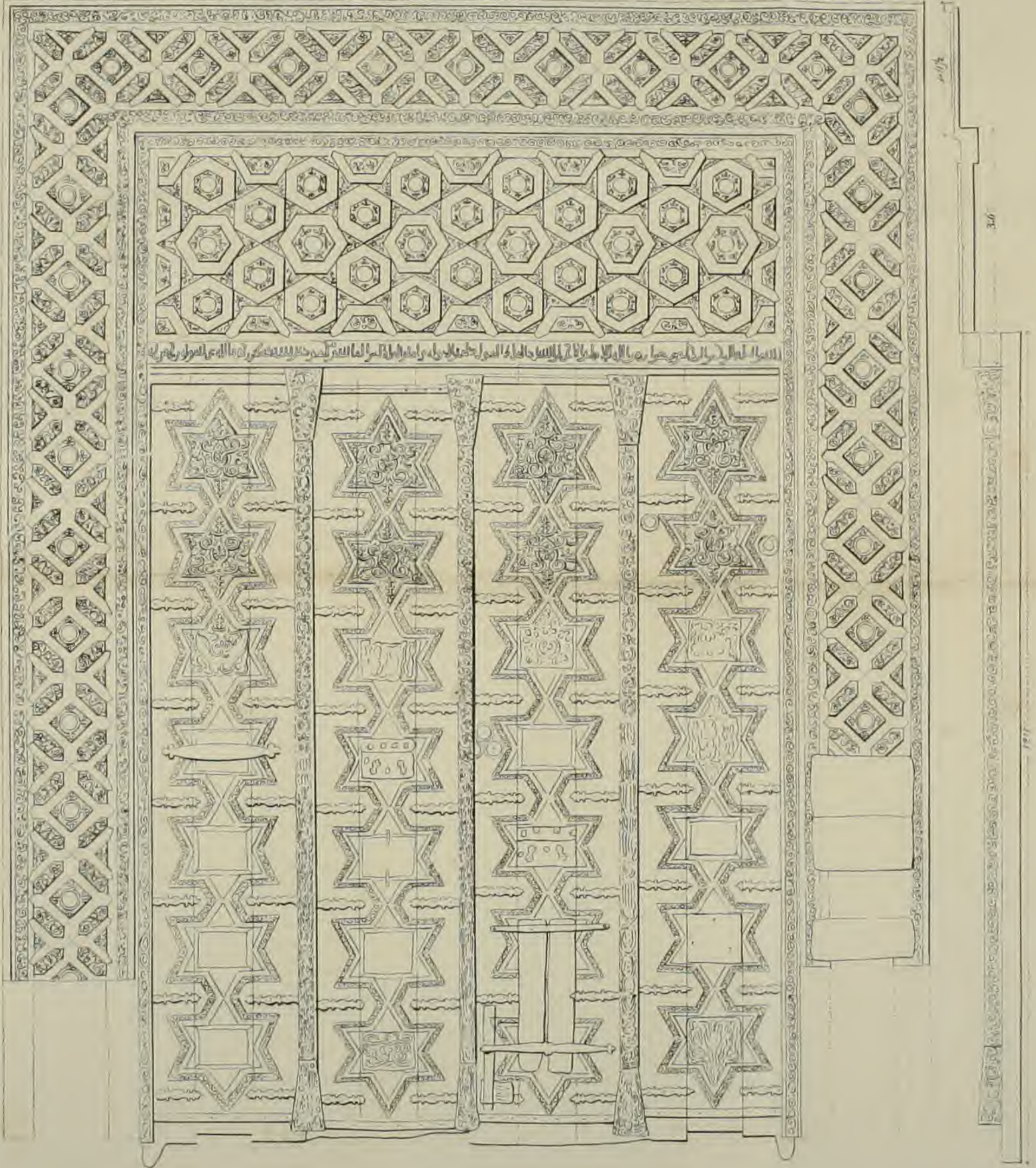


A Drawing of
The Gates of Somrath
to accompany

A Committee Report

8th Nov. 1842. Peshawar.

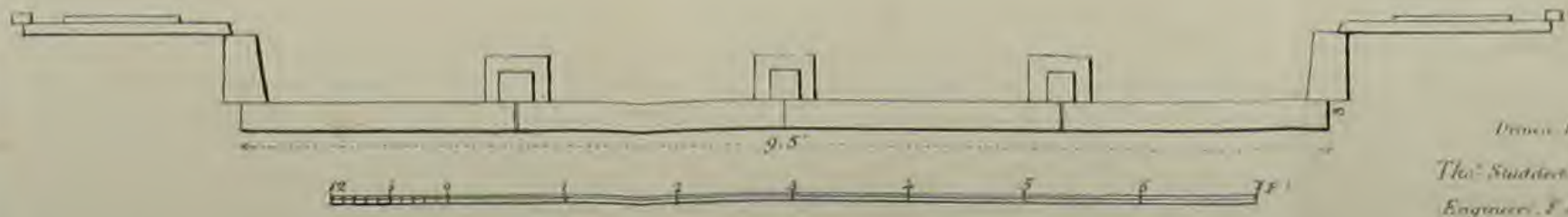
1141



1142

36

1141



Drawn by
Theo. Studdert, Esq.
Engineer & Architect

Edw. Sanders, Major
Engineer, President

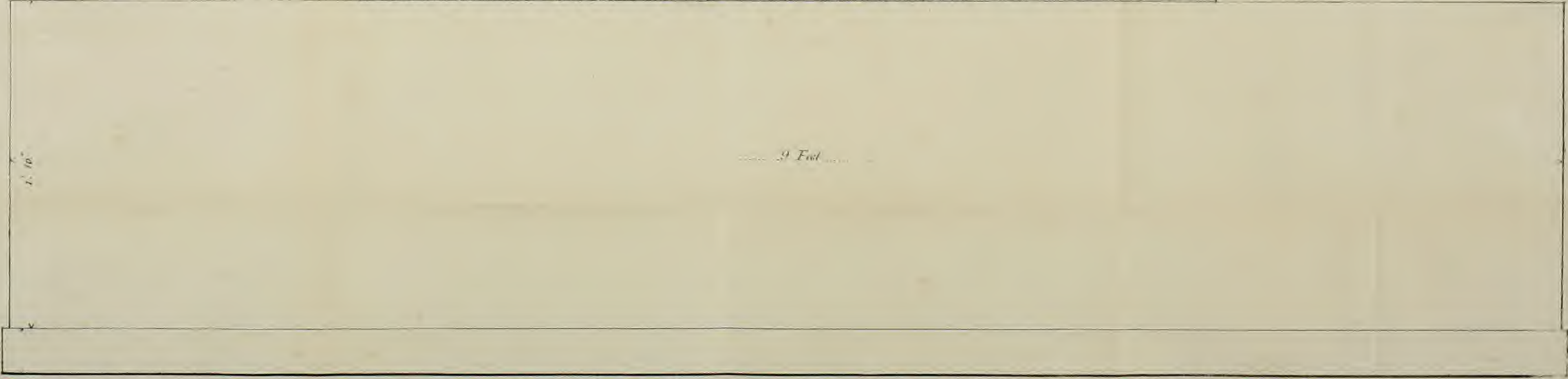


A Sketch
of the
Marble Tomb of Sultan Mahmud

*By Tho^s Stoddart, Lieut^t
Engineers*



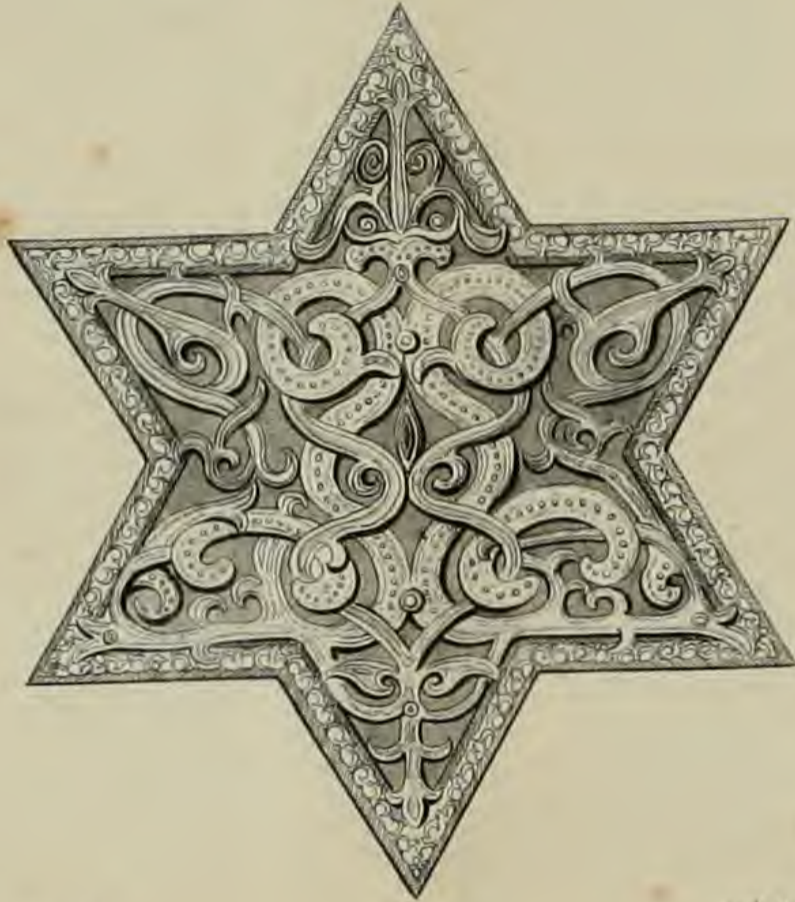
9 Feet





N^o 1.

Top Star on the left leaf.



N^o 6.

N^o 5.

2^d from the top on the 2^d leaf from the left

2^d from the top on the right leaf





*Copy in the Suls Character of the Cufic Inscription on the Minaret
(Munarah,) nearest the village of Rozah.*

بسم الله الرحمن الرحيم السلطان الاكرم
ملك الاسلام يمين الدولة وامين الملة ابوالمظفر ظهير المسلمين و
معين المساكين ابي القاسم محمود انار الله برهانه بن سبكتكين غازي
المغازي امير المومنين امر بدأ هذا العامة العالة العلية قدمت
باليمن والبركتة

Translation.

In the name of God the most merciful.

The high and mighty Sultan, the Melic of Islam, the right arm of State, Trustee of the Faith, the victory-crowned, the patron of Moslems, the aid of the destitute, the munificence endowed, Mahmood, (may God glorify his Testimony,) son of Subaktageen, the Champion of Champions, the Emir of Moslems, ordered the construction of this lofty of loftiest of Monuments: and of a certainty it has been happily and prosperously completed.

*Copy in the Suls Character of the Cufic Inscription on the Minaret,
(Munarah,) nearest the town of Ghuznee.*

بسم الله الرحمن الرحيم امر السلطان
الاعظم ملك الاسلام اعلام الملكة والدولة ابوسعيد مسعود بن ظهير
الدولة محمود ابوابراهيم نصير الدين امير المومنين يمين المملكة
امين الملة مالك رقاب الامم سلطان المكرم الحاقان مولى ملوك
العرب والعجم خلد الله تعلي ملكه و سلطانه وافاض علي العلمين
بره واحسانه غفر الله لاولوالدي ولجميع المسلمين

Translation.

In the name of God the most merciful.

(Erected.) By order of the mighty Sultan, the Melic of Islam, the standard of dominion and wealth, the august Masood, son of the supporter of the State, Mahmood, father of Ibraheem ; defender of the Faith, Emir of Moslems, the right arm of dominion, the Trustee of the Faith, the master of the necks of the nations, the noble and imperial Sultan, Lord of the countries of Arabia and Persia. May the great God perpetuate his throne and kingdom, commemorated be his beneficence. May God forgive the sins of himself, his parents, and of all Moslems.

Extract from the Journal of Lieut. J. A. WELLER, Executive Engineer and Officiating Junior Assistant Commissioner in Keemaon, on a trip to the Bulcha and Oonta Dhoora Passes with an eye-sketch. Forwarded by J. H. BATTEN, Esq. C. S., Keemaon.

26th May, 1842.—Milum. Up early, and started at 4h. 20m. A. M. after *burrals*, a herd of which my shikaree had seen the previous evening on the N. E. side of the hill behind Milum. For some reason, Nagoo and Dhunsing, who were acquainted with the country, wished me to ascend the hill behind Milum a little to the West, and then go over the crest after the *burrals*; I consented of course, and believe my bad luck in not killing any thing, was owing to this mistake. For when I did see the *burrals*, it was late in the morning, and they were ascending the hill where my shikaree had seen them, after feeding; whereas had I gone round to the N. E., I should most probably have seen them feeding low down early in the morning, and had a fair chance of one or two good shots. However, at 5h. 5m. I reached the top of hill visible from Milum, by a dangerous sheep track, thence up a continuous slope of moderate steepness, affording plentiful grazing to sheep and cattle, a few of which latter (jooboos) were feeding; continued ascent till 7h. 5m., when I halted for a cheroot and some biscuits. Dense clouds, and a heavy drifting haze shut out the surrounding hills from view; this I much regretted, as being North of Nundee Devi, and at a good elevation, I might have seen a magnificent view of that mountain and its neighbouring peaks, had the sky been clear. Possibly

also, I might have seen Oonta Dhura. Small flakes of snow fell now and then, and the weather was very cold. At 7h. 42m. started again up the ascent, and on till 9 A. M., when on the side of a hill North of me, and separated by a rather steep descent, one of my party spied a herd of sixteen or twenty *burrals*. We all lay down immediately, and crept back over the crest of the hill, but unfortunately the *burrals* had seen us, and commenced slowly ascending the hill. I made the best haste I could up the hill, keeping its crest between me and the *burrals*, until arriving at a spot opposite to where they were in a snowy hollow. Now I should have gone still higher to a craggy peak, and left a man to go below the *burrals*, and drive them up when he saw me at the top. Instead of this, the shikaree thought I could get close to them by creeping across the intermediate space, covered by the side of the hollow in which the *burrals* were. I did as he wished, but the space we had to cross was landslip, from which stones occasionally rolled down in spite of all our care. The *burrals* must have heard these, and were ascending the opposite side of the hollow; when getting sight of me, they made towards the crest of the hill at once. I saw them pass over, each in turn halting for a second or two upon a small rock; but a thick haze was drifting between them and me, and constantly shut them out from my view; owing to this haze, the distance appeared to me greater than I afterwards found it to be; and as the *burrals* are seldom to be approached a second time after once being alarmed, I put up the second sight of my rifle and took one shot when the haze was rather less dense than usual; missed, the bullet probably going too high, and almost immediately the haze shut out every object within ten yards of me, so that I could not get a second shot. The shikaree ascended the hill as fast as he could, but was unable to perceive where the herd went; and after going up to the crest, I halted at 9h. 30m. for a cheroot, infinitely disgusted with my bad luck in not getting one decent shot; for firing through a cloud can hardly be called one. Started at 9h. 48m., made a slight sweep round to the West for the chance of seeing the *burrals* again, but in vain, and commenced the descent to Milum. The hill side was not very steep, and consisted of one immense sheet of loose slate, an incipient landslip in fact. I descended very fast almost at a run, snow falling and bitterly cold, East wind blowing. This changed as I got

lower down, and the sun was intensely hot, so that I was glad to find myself back at the village at half-past twelve, after nearly eight and a quarter hours' exertion, seven and a quarter hours of which were incessant travelling. The sun when it does shine out is very powerful, or rather it feels so, and my face is now half raw, and the colour of a beefsteak. The pain and annoyance of this is all the inconvenience I have yet felt, and my health and strength are (thank God) first rate, a state hardly to have been expected.

After breakfast, I was much surprised to find that the Lama* had suddenly made up his mind to start for Tooling, and had left with six ponies and two servants shortly after I started in the morning; no person was acquainted with his intentions, or can give any explanation for his sudden departure. The Lama's remaining two or three servants, who were to have followed with some goats, &c., treated themselves to a jollification upon the happy event of their master's return, and are now all dead drunk. In the course of the afternoon, they came to where I am living, and one man commenced singing by no means unmelodious songs, accompanying himself with motions of the hands, feet and body, exactly similar to those of nautch women at Almora, or in the plains. Another fell down with an awful thump on the hard stones, but was picked up unhurt and laughing. I was rather glad when they were persuaded by me to go to sleep. These people started early next morning. Nagoo describes them as wonderful travellers, and says, they think nothing of ascending Oonta Dhura with a heavy load.

27th May.—Had a long sleep after yesterday's fag, and did not get up till 6h. 30m. A. M. Though if my heel had not been galled and face so very painful, I should probably have tried the *burrul* again. Morning very mild and pleasant. Ther. 55° and no wind, but about 10 A. M. an East wind sprung up. Seven or eight jooboos reported present, and the remainder faithfully promised by evening, so that I may start to-morrow morning. Busied myself during the day in selecting clothes, &c. for the trip, and in making a plan of the country beyond the Pass, according to Nagoo's information. Ther, in the sun at noon, 80°;

* The Lama of Tooling, a refugee to Almora during the invasion of Thibet by Zorawur Sing and the Sikhs, and after the spoliation of his temple by them.—J. H. B.

about 11 o'clock it was 5 or 6 degrees higher. During the morning, I endeavoured to obtain some information as to the country beyond the Pass, but a number of people being present, I did not like to ask such minute questions as would enable me to map down places with any degree of accuracy, and the inattention of the Boteas with reference to north and south, renders it difficult to obtain correct ideas of localities from their information. Nagoo produced a map, of which I may make something when I can get him quietly alone. At 2h. 50m. I started to see the Sunchee Koond, a small sheet of water some distance up the glen of the Goree river, held in great repute as a place of pilgrimage. I reached it 4h. 45m. travelling slowly along a gentle ascent, intersected by numerous water-courses from the hill on right, (North,) and found it to consist of a small triangular-shaped piece of greenish water, perhaps 100 yards by 80 in its largest dimensions. I had no means of ascertaining the depth. The mass of desolation, as described at the source of the Goree, continues thus far up; and how much farther no one can, or will, inform me. The fissures hereabouts are narrow, instead of being crater-like; and the ice where visible is more nearly the color of snow. On the opposite (South) side, huge accumulations of ice and gravel are to be seen in the openings between the hills; and generally, the sides of the hills in this vicinity do not appear so much cut up by landslips as lower down. The weather was very cloudy, and bitterly cold, with a few drops of rain occasionally. I had no opportunity therefore of gaining a view further Westward, or on either side to any extent, but I consider this glen would amply repay a few days devoted to its inspection. Once on either side, I had a view of the old ice high up on the hills; and its light sea-green color, with strongly defined and fantastical lines of shape (castles, stairs, &c. &c.) formed a very pleasing and grand appearance. I returned to Milum at 6h. 25m. P. M., and found matters progressing; likely to ensure my departure upwards to-morrow morning.

The only weighing implement I have seen this side of Munsharee was a steel-yard at Milum, and I was told that it came from Tibet, where they are commonly used.

28th May.—Up at 4h. 20m. A. M., ther. 49° in the sleeping room, morning tolerably clear and mild. Much delay occurred in loading the jooboos, but at last all was ready, and I started for Doong at 6h.

25m. A. M. I had with me two servants, (a kitmutgur and shikaree boy,) my bedding, (no bed,) some clothes, powder and ball, a little wine, &c., and very scant preparations for eating, the whole calculated for an eight days' trip. Nagoo Boora, Dhunsing, Geitsing, a road chuprassee, and the Luspa shikaree, with four coolies, (hired at four annas a day each after much bargaining,) accompanied me. We had fifteen jooboos; viz. six for riding on, and nine for three tents, my bedding and clothes, wood, &c. Two of these were very lightly laden, in order to bring back any skins or horns I might procure. One of the coolies carried my wines cheroots, &c., a very light load, and the articles not packed upon the jooboos. I had a sore heel from the shooting excursion of 26th, and could not walk without feeling much pain, I therefore started in the *dandee*; but the road was so infamously bad, that I was soon compelled to walk as best I could. At 7h. 7m. came to the first snow-bed over the Goonka river; at 8h. 20m. near Lungon river saw two *burrals*, but they were some distance up the hill, and saw us approach, when they immediately ascended and disappeared over the crest. The sun was powerful, and my heel very sore, so that I did not incline to follow these *burrals* even had the hill been easy, instead of being almost inaccessible. At 8h. 55m. reached the Sungon Nuddee coming down from the East, two magnificent snowy peaks were visible in the direction of its source. This small Nuddee has salt, or something of the kind, on its banks a short way up, and *burrals* resort there, before the passage of sheep and goats upwards drives them to more remote places. Probably had I been here early in the morning, the two *burrals* I saw, would have been feeding near the Nuddee, and afforded an easy shot. I crossed the Sungon by a small temporary bridge, and halted at 9h. 5m. for the jooboos to come up, feeling very tired; sun unpleasantly warm to the skin, though not high I fancy in actual temperature. I started again at 9h. 30m. and at 10h. 15m. reached Tulla Sulong, a small rather level spot, furnishing a little grass. Halted here to breakfast, and let the jooboos feed before moving on to Doong, where there is no pasturage for cattle. Slept till half-past twelve, when breakfast was ready. A strong South wind blowing, with dust in abundance. Opposite Sulong, on the right bank of Goonka (West) is a tolerable waterfall, or rather series of cascades from the top to the bottom of hill. The road thus far, (alternately on

either bank of the Goonka, but chiefly on the left,) infamously bad. The hills on either side a series of dreary looking landslips or bare sheets of rock; and in the rains, when Bhoteeas travel up and down, this road must be really dangerous from constant landslips and falling in of the banks. Hardly any snow visible on the hill sides; and Oonta Dhura itself is nearly equally bare, if it is the hill pointed out to me when about half way. Ther. 77° in tent, at 1h. 30m. p. m.

Riding a jooboo is by no means a bad mode of travelling. You sit comfortably in a high demi-pack saddle,* which affords a capital hold in front; a man leads the jooboo by a string passed through its nose; and the pace though slow is very sure; two or three times during this trip my jooboo fell, but no harm was done. In general, it is wonderful what difficult ground they will carry a man over. Jooboos laden in fifty minutes, and we started again at 3 p. m. Weather had become cloudy and cold. At 4h. 40m. crossed to right bank of Goonka river by a natural bridge formed by three rocks, with fissures filled in by loose stones where requisite, and at 4h. 45m. halted at Doong, (no village,) a little West of the junction of the Goonka and Lusher rivers, which come down from the N. W. and N. E. respectively. The Goonka is covered by a huge mass of ice and stones, 4 or 500 yards higher up; and so doubtless is the Lusher, though not where it is visible from Doong. Road very bad; hills on either side nothing but landslips or bare precipices, with very little snow visible. I had one fine view during the afternoon march of a huge mass of ice in the most fantastic shapes, behind three peaks West of the Goonka; but with this exception, the prospect everywhere was most desolate, and above Doong, it is, if possible, more so. Not a shrub, and hardly a blade of grass visible any where. One eagle, two or three of the chough birds, and as many smaller birds, were all the signs of life met with. There was formerly a shorter road to Chirchun up the Lusher river, but it has been abandoned as too dangerous from new snow covering fissures in the old ice, and yielding when trod on, thus instantaneously precipitating man and beast down a narrow fissure, heaven only knows how deep. Latterly, when men have attempted this route, they did so with

* The pack saddle used for jooboos is an excellent one; and I took one down as a pattern, in event of one's requiring to use bullocks or ponies as baggage animals.

a stout long stick tied to the waist, in order to catch the sides of fissures, and thus afford a chance of getting out again. This might answer when the stick happened to be transversely to the fissure; but when lengthwise with it, would be no avail. I suggested an improvement to Nagoo, (who told me this,) viz. tying two sticks cross-wise to the waist, and thus ensuring that one of them would catch the side of the fissure whichever way it ran; but these sticks would be a most awkward incumbrance to walking in such hills. Just as we reached Doong, two or three men were seen in the distance going towards the Pass. They would sleep on the road if unable to cross before dark; but the very circumstance of their attempting the Pass at so late an hour, would seem to prove, that its difficulties have been much overstated. I shall (D. V.) be however more qualified to judge by this time to-morrow. At 5h. 55m. P. M. ther. $52\frac{1}{2}^{\circ}$ in open air, boiled at $188\frac{1}{2}^{\circ}$, elevation (by Barron*) 14,523. Surely this is too much. ? The rate of travelling to-day may have been $2\frac{1}{4}$ to $2\frac{1}{2}$ miles an hour.

29th May.—Up at 4h. 30m. A. M., after a very bad night's rest. Ther. 35° in sleeping tent; boiled at 189° , which would reduce the elevation, noted from Doong yesterday, to 14,214 feet. Started at 5h. 10m., morning deliciously clear, but very cold with a light West wind. Ascent till 6h. 15m. up mass of ice and stones, close under hill to N.E., quite bare of snow. The hills to S.W. from a quarter to half a mile distant being tolerably covered with snow. The top of this ascent is where Batten turned back, yesterday twelve month, on account of snow falling and being thick all round. What a contrast to this year! From 6h. 15m. to 6h. 45m., a slight descent, and then along level snow-beds with the Goonka river, now a very small stream, flowing on my left. There had been very hard frost during the night, and every little pool of water was covered with from a quarter to half an inch of ice. Snow very firm and crisp. I had walked for the three-quarters of an hour, and now halted for the people to come up. Started again at 6h. 55m. up a steep ascent of loose stones, &c. (called Bumras;) reached the top at 7h. 15m. and then turned to the right Eastward. Some fine masses of ice on hill to left or West. The soil

* Mr. Barron of Shahjehanpoor, a great traveller in the hills, gave Lieut. Weller some table for calculating heights by the boiling temperature, and this is always alluded to.—J. H. B.

on the top of Bhumras, and in advance, almost black. Oonta Dhura was visible after turning Eastward, and seemed to be a low black hill, of moderate steepness, with more soil than snow visible. But its continuations East and West were finely covered with snow. Continuous though not steep ascent till 8 o'clock, when I reached the foot of Oonta Dhura, (called Oonta ke Jum,) where people generally halt before cresting the Pass. A small rill of water goes down to the S. W., and probably forms the source of the Goonka river. Road (or track) thus far chiefly over snow-beds, said to cover enormous masses of ice; these melt and split into fissures during the rains, causing much inconvenience and danger to travellers.

I resolved on walking over the Pass to ascertain how my breathing would be affected; and started without making any halt at the foot. The ascent was longer than I expected, but I walked very slowly, halting every now and then for a second or two, so as not to lose my wind, and at 9h. 15m. A. M., reached the summit. The hill side was very wet, but whether from snow recently melted, or from springs below the surface, I know not. During the ascent, I certainly felt my breathing slightly affected, and had I walked fast the affection would probably have been severe. In going over the Luspa hill on the 24th instant, I felt much greater distress, but there I travelled quickly, and the sun was more powerful. During my ascent of Oonta, the sun shone out with great splendour; and the dazzling brilliancy of the snow on either side was truly wonderful. I had never seen or imagined any thing comparable to it, what then must be the effect when nothing but snow is visible in every direction? The Bootees all put on thin horse hair spectacles. I had on a pair, and a green veil also, but my eyes soon became painful, and I was almost stupid from pain before reaching the halting place of Topee Doonga. What may be the difficulties of this Pass after a severe winter, I of course cannot judge; but it would be absurd to speak of difficulties this year, (except the minor ones of cold and glare); and I feel certain that I could walk from Milum to the summit of Oonta Dhura in one day; the only drawback being the fearfully bad road.*

* At the foot of Oonta, snow pheasants (huoneal or huonwal) were calling, but high up in the snow. It is hard to imagine what these birds live on, there not being a berry or particle of vegetation for miles round. Yesterday a man brought me seven

On the Pass the ther. when taken from its case was 45° . It rose in the sun to 61° , and boiled at 182° , or a little under, snow being used instead of water. The elevation by Barron's rule would be 18,540 feet; but this must be greatly in excess. There are five small ridges of stone in the crest, which look like pillars from below. It is believed that a ghost kills any one who sleeps near them; but more probably cold is the agent. There was a bitter cold wind blowing, and it is described as awful towards the end of the rains. Dhunsing told me, that in September twenty-five years ago, he lost 120 sheep swept over the North face of the Pass by the wind. His servants escaped to Milum with great difficulty; and the borax with which the sheep had been laden, was recovered next season. The south face and crest of the Pass consist of a black soil, apparently the detritus of a black slate, which latter is visible here and there below the soil. I was much disappointed with the crest of the Pass. The view South is very limited. Nundi Devi not visible, North-East and North a few hills are visible, North-west is a sea of hills moderately covered with snow, and hardly any of them appearing of great elevation. Indeed, were it not for the Louka river, (a small stream,) rising at the foot of the North slope, and flowing due North, I should have been sceptical as to standing on the crest of one of the few Passes into Tibet, and the highest one too. North-east are three bare hills, the first called Gentee, with behind it, not visible, two other hills, which have to be passed on the direct route to Chirchan. I know not what is the name of the centre hill, the third is Chingoor. North, in the distance, is the Balcha ridge, the last range between Hindoostan and Tibet, with intermediately a high gorge above (south of) Chingoor, connecting the hills East and West. From North to nearly West, there is a decent assemblage of hills well covered with snow, (those N. E. and N. having very little). The highest of these is a conical peak above (North of) Gertee, where copper* is said to be found. This peak bears about due N. W. from the crest of the Pass. Girtee is on the road from Mularee below the Neetee Pass, but to reach either Gertee, Mularee or Neetee

eggs from the nest of one of these birds, and wanted me to eat them. I declined this, and he enjoyed them for his own dinner, cooked up somehow with ghee. The eggs were nearly as large as turkey's eggs, white, with lightish-brown spots all over.

* There are lead mines at Ghentee.—J. H. B.

from Jawahur, without going round by the South, you must cross Oonta Dhura, of which I was not before aware. At 10h. 10m. A. M., I commenced descending the North slope of Oonta Dhura, one unbroken sheet of steep snow till 10h. 37m. Thence moderate descent, chiefly over snow-beds cut into most troublesome ridges by the wind, till 11h. 35m., when I crossed to left bank of Louka river. Continued along this bank over snow-beds and bare hill sides, till 12h. 45m., then turned sharp to left (West,) and after the worst descent I have yet had, through snow and slush, reached Topee Doongah. Halting place (no village) at 12h. 58m. awfully tired; face blistered by sun and wind, and eyes very painful. Topee Doonga is a small level spot on the left (South) bank of Louka river, which latter turns to the West where I did, being joined there by the Doldunkur Nuddee coming from East, between the second and third hills, noted as visible to N. E. from the crest of the Pass. There is a little herbage at Topee Doonga, and further West, grass and low brushwood (on the opposite side) are tolerably plentiful. South, the hill sides are covered with snow, and recede gently for a short distance North; across the river is one bare precipitous sheet of rock, with landslips along the base. East is the West face of the second hill mentioned above, equally bare and precipitous, with the Doldunkur Nuddee coming down between its North, and the South side of Chingoor hill. West, about three-quarters of a mile down, the united Louka and Doldunkur streams are joined by the Torgurh Nuddee coming down from S. E. by S. These united, flow on Westwards, through a wide gravelly channel to Gertee, where another stream joins, and the whole flow on to Mularee, Josee Muth, &c., forming I imagine the Geenthee river, marked in sheet sixty-six of Indian Atlas. The junction of the Torgurh and Louka is curious.

They flow nearly parallel for some hundred yards before the junction, the former along the top, and the latter along the base of a precipice, which may be 150 yards high at its highest point, and diminishes to nothing at the junction. At 6h. 30m. P. M. ther. 48° , boiled at $186\frac{1}{2}$ or 187° . Next morning at 5h. 30m. A. M. ther. 28° , boiled at $186\frac{1}{2}$ or $187\frac{1}{2}$; elevation of Topee Doong (a bitter cold place) from 15,759 to 15,450 feet by Barron's rule.

30th May—Up at 5 A. M. ther. 27° * in my sleeping tent, but as there

* Compare with Calcutta same hour and same date.—J. H. B. Probably not below 85° —ED.

was no wind, I did not feel the cold so much as on the top of Oonta Dhura yesterday, where the ther. was 61°. Saw a large raven (size of the English raven, or very near it;) but could not get a shot at him. Started at 6h. 50m. A. M., descended to river, then turned up East along it, and at 7h. 8m. A. M. crossed the Louka, just above its junction with Doldunka, stream rapid, but not above knee-deep, and some twenty feet wide. An East wind had sprung up about starting time, and brought intense cold with it. Shortly after the wind lulled, heavy clouds to N. W. and South, and a light snow falling, and continued up the Doldunka, chiefly flowing under snow between two steep sheets of rock, till 7h. 35m., then turned up left (North) to the Kalee Mutteea Churhai; very steep, covered with loose stones over a black crumbling slate. The latter part of ascent was less steep, but without holding on by a jooboo's tail, the whole of it would have been a most tedious job. I picked up a few bad fossils by the way; also pieces of a thin cylindrical slate-coloured stuff, called *doda ha puthur*, (milk stones) and used by the Booteas as an application to swelled nipples in women. Reached top of ascent at 9h. 15m. (This is the intermediate gorge mentioned as visible from Oonta Dhura.) Occasional snow beds during the latter part, hills on either side bare precipitous sheets of sand-stone. Had a good view of Oonta, and took a rough sketch, to be perfected hereafter, perhaps.* The crest is composed of small loose stones rising in a sweep to the top of the hills on either side (East and West) North beyond a good extent of valley and low hills covered with brush-wood, rises the Buloha range, beyond which are the plains of Tibet. This range is here and there streaked with snow. The hills from Oonta, thus far, seem chiefly of brown sand-stone. The strata mostly dip East, and are very vertical. I observed some strata here and there. On the crest here I picked up a good sized piece of white alabaster-looking stone, very soft. The Booteas consider it of value, call it *huon phool*, (snow flower,) and dissolve it in water with two or three medicines as a lotion for sore eyes, &c. &c. Commenced the descent to Chingoor, (a halting place only,) at 9h. 40m.; route lay about due North over alternate snow-beds and loose stones from the hill above (E.); and was bounded E. and W. by two high ranges of (I think)

* See Sketch.

bare sand-stone, with a small stream flowing North in the hollow between them, chiefly under snow-beds. The hills on either side are perpetually crumbling away, thus forming immense heaps of loose stones all along their bases. There was a good deal of snow on the North slopes of the ravines (or khunds) and otherwise the prospect was extremely desolate. At 11h. 55m. reached Chingnoo, after a most tiresome and hot descent. Nagoo, &c. wanted to go further, as but very scanty forage was procurable here for the cattle, (the first vegetation we had met with since morning); but I was quite tired and would go no further before eating something. Chingnoo is a small level spot on the right or East bank of the stream noted above; and on the left or South bank of another stream coming down from the East, and joining the former one here. The united streams turn West a mile or two in advance, and eventually join the Louka, &c. by a cut through the hills near Gertee. Just north of Chingnoo, across the stream, a succession of low hills commence extending northwards to the river below Lufkhel. These are covered with a low creeping thorn, (called *damah*,) which is found to within two or three miles of Milum; and the hollows afford very good pasturage. Just as we approached Chingnoo, the Lama, (who had been encamped somewhere near us at Topee Doonga yesterday,) was seen starting on his march from Chingnoo, with his small party, seven or eight men, and half a dozen ponies. These ponies must be really good ones to have come thus far without accident; but they were knocked up by the Pass, and compelled the Lama to halt yesterday. This was very fortunate, for I cannot attribute the Lama's sudden departure from Milum to any thing but fear of my crossing the Pass; or to a desire of stopping me by going ahead, and giving information. After breakfast, we shall move on until we come up with his party; and then by counting his people morning and evening, all fear of annoyance will be obviated. Eloquence will also be exerted to convince the Lama, how unjust it would be to cause me trouble after the kind reception he met with in our territory; and he will be threatened with non-admission into our provinces again, should he cause the Booteas trouble on my account; so I hope we may manage him yet. Altogether though, I do not quite like the state of affairs, and glad enough shall I be to find myself safe again at Milum, after a view of Tibet, and a little of the glorious sporting

said to abound hereabouts. "*Rheow* is the talismanic word to make a jooboo quicken his pace, though a whip has better effect. Safe as they are, my jooboo has fallen three times with me; but no where in very dangerous places, and no harm done.

Snow-beds are always most difficult at the sides, the middle being generally firm and hard.

Pace to-day one and half mile an hour, or possibly a little more on the whole. Yesterday one and quarter to one and half mile; and the day before about two and half miles an hour.

Booteea tents all blanket, or upper part blanket and lower part cloth. A strip of about six inches wide is left open along the top to let smoke out, the rains never being heavy enough to cause inconvenience from such an opening. Dhun Sing tells me, that just now it is so hot below Dhapa, that sealing wax melts if carried on the person during the day!!!(?) The appearance of hills looking at them from South and from North is widely different. Looking from the South, you see only the South face of ravines, &c., on which hardly a trace of snow will be visible. But looking from the North, you see only the North slopes; and these are generally covered with snow, giving the entire hill the appearance of being so covered.

At Topee Doonga this morning, I saw a tolerable number of larks, or some small bird of this sort; also one or two of the small purple black birds, a specimen of which I unfortunately failed to procure. At Chingnoo, several choughs were flying about; their call exactly like the catcall used by young blackguards at home. At Chingnoo, were numerous burrows of the "*pfheaf*." This animal is described as smaller than a dog, of a reddish colour, sits up at the mouth of his burrow, and remains dormant in the winter. It must be a squirrel; much to my vexation I failed in even getting a sight of one. At Chingnoo 2h. 30m. P. M. ther. 68° in shade of tent, boiled at $186\frac{1}{2}$ or 187° elevation (by Barron,) 15,759 to 15,450 feet.

30th May.—At 3h. 25m. P. M., the servants started for Lufkhel, and I went with Nagoo across the Chingnoo stream, and along its west bank to look for *burrat*. After some time, I saw three on the hill side, a long way off and far up; had a long sneak, but found the hill side so steep, that when within fifty yards of the *burrat*, I could not depress my gun sufficiently to fire at them standing under a rock. They

immediately got sight of me and rushed off, so I only had one long running shot, and missed. We then turned down into the bed of the stream, and walked for some distance along the snow-beds covering it, between high steep cliffs. No more *burrals*, however, were visible, and it became time to move on. Turned up East over some low hillocks, most pleasantly covered with stunted palm trees* in flower. The low close thorn also in flower, yellow-shaped, like sweet pea flower†. Now and then the iris of deep or pale blue color, a sort of wild garlic which the Bhooteas eat, in appearance just like iris or narcissus shoots; “*dooloo*,” I think *rhubarb*,‡ and most delicious looking emerald colored young grasses, fringing little rills of water flowing between the hillocks. Hereabouts I saw a small dry water-course coming from the top of a low isolated black hill (bare;) in the bed of this were numerous salagrams, which had evidently been washed from the soil during rain. I picked up thirty or forty, and could have found hundreds, but time admitted not. Very few of the specimens were perfect, as they get broken when rolled down by the stream; but I should think perfect specimens could be obtained by digging. Salagrams are formed by an incrustation of (probably lime) stone enclosing the ammonite in a spherical shape, of all sizes, from a marble to a man’s head nearly. These cases as it were, burst either from some agency within themselves, or on being set in motion by water falling, &c. and display the fossils. Yet among the numbers that I broke, (they were very hard,) I never found a decent specimen inside, and rarely even the trace of one. In all of these I suppose the originally enclosed shell must have been decomposed and absorbed by some peculiarity in the chemical nature of the enclosing mass. After continuing East for some distance over the same kind of ground, (said to be usually a favorite resort of *burrals*, though none were visible at the time,) I came upon the road to Lufkhel; and while descending to the river saw a little East of the road, a small triangular sheet of deep blue water, perhaps eighty yards long each side. North (in advance) across the river about a mile off, another sheet of water was visible, less darkly colored than this; two or three rills of water flowed down along East

* Probably a kind of willow is here meant.

† Tartaric furze and juniper bushes are the thorny plants in the Passes.

‡ Yes.—J. H. B.

of road to the river, the bed of which, including debouchements of these rills, is fully half a mile wide, formed of loose stones and gravel.

At 6h. 55m. p. m., reached the river flowing from East nearly due West, and joining the Chingnoo stream about a mile or less below Lufkhel, after passing through a magnificently bold cleft in the hill of solid rock for many hundred feet of perpendicular height. This river comes from the hill North of Lufkhel in several small streams. These unite somewhere to the East, and had been swollen, either by rain or some other cause into a rapid torrent thirty or forty yards wide, through which the jooboos carried us with very great difficulty. In fact it was dangerous work, but this rapid rise will probably decrease very speedily, as the river is usually fordable by sheep. I reached Lufkhel at 7h. 10m. a. m., much fatigued. This is a pretty halting place (no village) a few hundred feet above the river, shut in by an amphitheatre of low hills, which form the base of the last range before Thibet. The thorn bush (*damah*) is tolerably abundant, and the hollows are covered with deliciously emerald-colored young grasses. The place is a favorite pasturage, and during the rains some of the nearest Thibet villagers pitch their tents here. Lufkhel and Topee Doongah were the refuge of numerous Thibetans, when the Seiks advanced last year.

My servants and jooboos had arrived sometime before me, after two and three quarter hours' travelling from Chingnoo.* Their road was excellent, and lay over a succession of the small hillocks I have described. The Lama was encamped at Lufkhel in a great state of alarm, and very indignant with Nagoo and Dhunsing, (whom he knew well,)

* At and about Chingnoo, there is a little grass for cattle, and I found one salgram here. I saw also the foot-print of an animal called "*chunkoo*." This I had supposed to be a small tiger, but from subsequent description of the color, hunting in packs, and lolling out the tongue when fatigued, it must be the wolf, and judging from the foot-prints, of large size. The "*chunkoo*" will kill jooboos, also whole flocks of sheep and goats if left untended. It also hunts the *burrul*, but is said never to attack a man. The "*thurwah*," is a smaller animal, slightly marked like a tiger, and hunts singly. (Perhaps *Felis macrocelis* hitherto supposed to be confined to Sumatra, but of which a specimen has just been received in our Museum from E. B. Ryan, Esq. who obtained it at Darjeeling. Eds.) Possibly I may yet see these animals. The two streams at Chingnoo have rather wide gravel beds, denoting a large body of water at some period of the year.

Much to my surprise, Nagoo informs me, that the jooboo will breed, either male or female, with the cow or bull. The produce is called "*toloo*," is but little used, and I fancy but rare. Nagoo could not tell me where one was to be seen.

for having brought me across the Pass. Fortunately, his people were all present, and Nagoo had no difficulty in persuading him, that I had come solely for shooting, and did not intend to advance further. Two men had just arrived from Dhapa or thereabouts in search of the Lama, bringing ghee and rice for his consumption. Their only news was, that the Lhasa force of from 5 to 7,000 men had moved on Ladakh, where the Seiks continued to hold out, and would probably have reached ere this date. These two men were stupid fellows, and had not been within many days journey of Lhasa, so that their information is deserving of but little credit. The general impression is, that the Lhasa force, even if it has moved, will not be able to capture the citadel of Ladakh from the 300 Seiks holding it.

31st May.—After a horrible night's rest, dreams of wonderful ascents and descents, &c., I rose at 5 A. M. and prepared for a hunt after *burrals*. Ther. 36° in sleeping tent, boiled at $188\frac{1}{2}^{\circ}$. Elevation 14,523 feet. I crossed the river and ascended a rather steep hill West of the road, when on the other side, much to my delight, I saw five or six *burrals*. The first that caught my eye was lying down at about ninety yards. I took a good aim with the long rifle, and hit him in the middle of the back. He jumped up and stood, the others running off, I fired one barrel of my double gun, (I thought I missed,) the bullet of which entered the jaw a little below the eye, still the *burrals* stood, and it seemed doubtful whether I should get him, though he was pouring blood; but my long rifle was now ready again, and after numerous attempts I was satisfied with the aim, and rolled him over, to my infinite delight, with a ball in the side. Thinking the others might not have gone far, I left the fallen *burrals* where he lay, and ran along the crest of the hill, and on the South face I saw four or five more standing very far down; knowing it would be useless attempting to get nearer, I put up the second sight of my rifle, and took a long steady aim at one standing lengthwise from me. He dropped to the shot hit fairly in the centre of the back, and I do not remember ever to have been so delighted with my shooting. The distance could not have been less than 160 yards. The remainder stood for a second or two, watching this poor brute's struggles to rise, and then made off. Two more, and a herd of seven or eight more made off, so that I had no chance of another shot, and prepared to return, having much

to my delight bagged two *burrals* (my first) by seven o'clock. Returning, I saw a brace of snow pheasants, but could not get near them. These birds in a mild season must be difficult to kill. They shew some white along the wings in flying, are of a good size, and have a melancholy sort of note, which they continue at intervals nearly all day. I got back to Lufkhel at 10h. 30m. much fatigued. Ther. in tent 87° ; at 11h. 45m. 88° ; and 90° at half-past 12; after which it became rapidly cooler. My success with the *burrals* this morning was doubly fortunate, as it convinced the Lama I had really come for shooting, and enabled me to propitiate himself and people by the present of half of one of the *burrals*, which highly delighted them. The Lama foretold I should have success in the morning, and was hugely pleased to see through a small pocket telescope he has, that I had been successful, as I descended the opposite hill in returning. Both *burrals* were females, and had consequently only small horns. The second killed was, I fancy, fully above the average size, and measured as follows:—

	<i>Ft.</i>	<i>In.</i>
Height from hoof to centre of shoulders,	2	10
Length from nose to insertion of tail,	4	$1\frac{1}{2}$
Girth behind fore legs,	3	$1\frac{1}{2}$

Color light brown, and nearly white on the belly. Dark brown stripes down the front of the legs. Hair, something between hair and quills, like what I fancy the softer parts of a porcupine's covering. May be weight about $1\frac{1}{2}$ maund, just as much as a strong man could carry after the entrails were taken out. But in October, when they are fat, probably some of the large males would weigh $2\frac{1}{2}$, or nearly three maunds.

Plenty of salagrams at Lufkhel; maunds could be collected in a day. I should have mentioned that the Lama requested me to take some of his tea this morning. I agreed, and it was served in a quaint copper tea-pot, exactly like an old fashioned coffee-pot. I drank about a pint of the decoction, which was chocolate colored, rather greasy, and of by no means bad flavour, though it had a peculiar twang which I can liken to nothing I remember to have tasted. The soda mixed with the tea is said to color it like brickdust or chocolate. When to be had, both sugar and milk are used with their tea, but this had neither. One of the Lama's men was amusing himself by slinging

stones at ravens and two large vultures during the day, but he did not project the stones with good aim, or to any considerable distance. Perhaps he was a bad hand at it. The sling was made of plaited hair. At 3h. 30m. I started northwards up a gentle ascent or two, (salagram hillocks,) and then turned West over a series of most lovely undulations. Some bare, (salagram hills,) others covered with the thorn bush, and rills of water, with superb pasturage in the hollows between. This style of country extends I know not how far, and might be ridden over at a rapid pace. It is bounded south by the range of hills which I noticed to the N. W. from Oonta Dhoora, particularly mentioning the conical hill above Gertee, which is now nearly as far South as it then appeared N. W. of me. These hills appear very steep and rocky, and shew much snow on their north side. The breadth of this tract may be two or three miles at most, and it is bounded north by the last range before the Thibet plains, rising into bare steep precipices. I was led here by a report that a wild horse had been seen in the morning, but it subsequently appeared, that the man sent to look out, had seen only the hind quarters of a "*neaudh*," and returned at once for fear of disturbing the horse, as he thought it to be. The "*neaudh*" is like the *burrall*, only much larger, with enormously thick horns and darkish colored hind quarters. I had a creep of some two hours, after three of them, but never got nearer than from a quarter to half a mile, and at 6 o'clock was forced to give up, with these and a herd of 20 or 30 ahead of me. I believed all along that they were large male *burrall*, but Nagoo and Dhusing, who remained behind with my telescope, swore they saw them to be "*neaudhs*" distinctly, and certainly I observed the dark hind quarters. Though I got no sport, I highly enjoyed this trip, though I suffered from the awful cold wind along the crests in returning. Horse dung (the people said of the wild animal) was abundant; as were also foot marks of the "*chankoo*," or some other beast of prey, nearly the size of a leopard's foot print, and to the circumstance of these latter, animals being about, Nagoo and Dhusing attributed the unusual scarcity of *burrall* in this favorite resort. Occasionally I saw the place where a *burrall* most probably had been killed. Got back to the tents at 7h. 15m. very tired. Had some stewed and roasted *burrall*'s flesh for dinner. The meat brown, and by no means badly flavored, although this is the worst season. Having lived on dhall and rice

since leaving Melum, I enjoyed this meat greatly; but did not sleep well after it. Face almost raw and very painful, with the hurt in my left heel becoming worse daily, I cannot give up the only opportunity I may ever have for shooting, &c. in this part of the country on account of this sore heel, so have cut away the back part of my shoes and boots, and limp along as I best may.

Bun-chour or Wild Yak.—This animal is found hereabout in the rains, and one of the Lama's people brought in to-day the horns and skull of a male, which he had killed when going down last year. The horns are short and of good thickness. Forehead unusually wide, and the horns and front part of skull, wanting the lower jaw, are a good load for a man.*

1st June.—Up at 4h. 20m. after a miserable night's rest, Ther. 31° in sleeping tent, and much the same in open air. Boiled at $188\frac{1}{2}$ to 189° ; started at 5h. 50m. with Nagoo and Dhunsing, on jooboos, for the crest of Bulcha ke Dhoora, or last ridge between Oonta Dhoora and the plains of Thibet. At 6h. 30m. travelling about N. E. by N. reached the top of ascent visible from Lufkhel; then turned a little more East, down the gentle descent and along level till 7h. 6m., when we reached the bed of our branch of the river, passing below Lufkhel. This is joined by numerous small streams coming down from the hills East and West, every here and there. Halted from 7h. 6m. to 7h. 15m., then along gentle ascent covered with thorn bushes "damah" and grass, till 8h. 4m., when we reached the foot of Bulcha. The spot where we arrived at the river is called Sungtah, a halting place for sheep, &c. A short distance from it, the river (or stream) divides into two small streams, one coming from about N. W., the other from N. E., and our route was up the latter. The hills on either side were of inconsiderable height, bare, precipitous, and crumbling. But towards the foot of Bulcha, they opened out a little; had a few thorn bushes on the slopes; and where the surface was abraded the soil appeared of a dark brick-dust color. Does this denote volcanic action? I am told the soil is much more extensively and deeply colored at Chungnoo, and near Tirtooporee. Halted to eat biscuits and rest the jooboos from 8h. 4m. to 8h. 33m. Then commenced the ascent, (which proved far

* The ground I passed over this afternoon, lies on either side of our road to Doongpoo.

more severe than I expected,) and reached the summit at 10h. 24m., having been delayed a few minutes by one of the jooboos turning refractory.*

On the summit is a small *dehta*, or heap of stones, with two or three pieces of rag tied on sticks, and to this Nagoo and Dhun Sing added a stone or two, they then salamed to the country below, and I began my questions. Instead of a plain which I had expected to see, the country is formed of alternate low hills and table lands, with a range of higher hills (well sprinkled with snow) in the distance, running N. W. to S. E. Missr is at the foot of this range, on the South face; the road from Gurtope to Tuklakote runs along the base of the same face, and it was by this route the Seikhs advanced last year. The Bulcha Pass must be fully as high as Oonta Dhoora; and although the weather was quite mild to-day, Nagoo assured me it was rarely the case, and that the wind and cold of Bulcha were more dreaded than those of Oonta. There was a thick haze Northward, and I could not therefore distinguish any thing clearly with my telescope. Chungnoo is, I believe, the only village to be seen. On the North face of Bulcha, a small stream, the Jhunkoo, rises, flowing North and a little West. This is joined by a stream coming from past Chirchun, and the two united form the Trisum river, which I could see in the distance, flowing North-westerly, a good sized river. To the Southward the peaks of Nundee Devi were visible, the larger one bearing South-west by South, also the Gertee peak S. W. Oonta Dhoora was not visible, being obscured by (I think) the Lavur hill (N.), however, I knew its direction exactly by the neighbouring peaks, and the bearing was due South. Round as far as to the West and a little North, the hills towards Mana were visible. From Bulcha it is two marches to Neetee, the intermediate halting place being Hotee.

<i>Bearing from Bulcha.</i>	<i>Name of Place.</i>	<i>No. of day's journey for laden Sheep.</i>
N. E. a little, N.	Chungnoo,	Three.
N. E.	Missr,	Four.

* In the valley were a few pigeons and choughs, also the Iris plover. There was a little snow here and there; also in the hill to the East, but none on those to the West. Towards the top of the ascent was a tolerable quantity of snow, but in detached portions.

Bearing from Bulcha.	Name of place.	No. of day' journey for laden Sheep.
North.	Gurtope,	Seven. { Two Gurphun, or Commissioners.
S. E. by E.	Taklakote,	Seven. { A Joompun, (or Jung-pun)*
N. W. by W.	{ Dhapa, Mungnung, Toling Mut, Chuprung, }	Five.—A Joompun. Six. Seven. Eight.—A Joompun.
N. W. a little, W. N.	Doongpoo,	Two or three.
N. E. by E.	Kyloss range,	Seven or eight.
E. perhaps a little S. (gneiss,)	Chirchun,	One. { A halting place only, no village.

The view from top of Bulcha was contracted by the slope of the hill East and West just in front, and by the distant haze; no vegetation was visible, and I doubt whether on the clearest day the prospect *as one* would be worth going to look at. From Bulcha it seems as though the hills came out from Oonta Dhoora on either side in the segment of a circle, of which Bulcha is the apex; but I doubt not they would present a similar appearance viewed from other points East and West in advance of the Oonta Dhoora range (as it were); and my previously formed opinion of the Passes being over the last hills between Hindoostan and Thibet, was quite incorrect.

I descended the hill in 45m.; 34m. more, to where I had met the river in going up; 36m. to the top of the ascent above Lufkhel; and 30m. to Lufkhel: total $2\frac{1}{4}$ hours, arriving at half-past one. I had expected to see *burrul*, and perhaps the *bun-chour* during this trip, but was disappointed; so at 3 o'clock I started off to yesterday evening's ground to look for the "*neaudhs*" and *burrul* I had seen yesterday. About half-past four, I saw what with great difficulty and the aid of my telescope I made out to be a wild horse ("*cheang*"), probably "wild ass" is the more correct term. This animal seemed about 12 hands high, short and compact, and more like a mule than a horse, particularly about the tail, which with the mane and face, was black, the legs and belly white, and the sides and back a reddish brown. When feed-

* Joompun—Magistrate and Collectors.

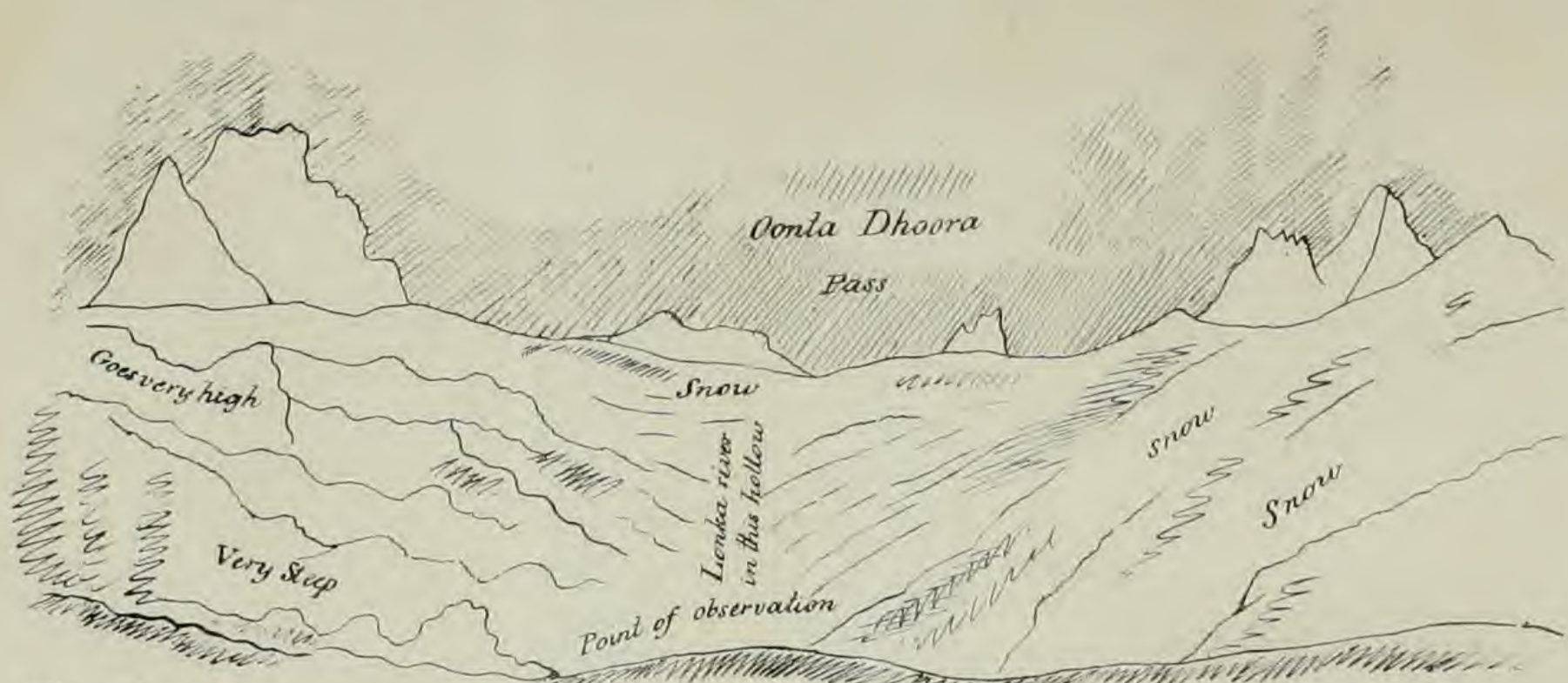
ing, the animal looked much like a small punchy native horse, but when alarmed, he drew the head up so erect, that he looked far more like a *burrall* or *neaudh*, in which its color assisted. The head was rather large, and the forehead broad. This animal proved the most cunning I had ever met, though they are said to be easily approached when in herds. He never stopped in a hollow, but always trotted briskly through to the next eminence, whence he could have a clear view all round. There, if I ran or walked up quickly, he would remain till I came within 150 to 200 yards. But if I did not arrive soon, or attempted to sneak within this distance, he trotted off to another eminence, and so on. Under these circumstances, I was perpetually out of wind, always running or walking fast, and my heart throbbing as though it would burst, so that I had no hope of killing the animal. When I found it impossible to get nearer, I ventured three shots at different times, (shaken as I was, with the second sight of my rifle up) for the mere chance of hitting. My second shot was an inch or so too high, for it grazed his back, and I saw the bullet fall close behind him. He kicked up furiously with both heels, and I flattered myself, was falling; but he trotted away again, to my infinite disappointment. This went on till past sunset, when I was forced to turn homewards, not having seen any other animal during the afternoon. Reached Lufkhel at 8 o'clock, quite fatigued by upwards of $13\frac{1}{2}$ hours work since morning.

I would have given much for another two days at Lufkhel, but my people were averse to remaining. The Lama also was dreadfully nervous, and irritated at my having gone to Bulcha, as he verily believed I was going on into Thibet, although my servants and tents remained behind. The Lama's people were all present, but the families of some of them were in tents, only seven or eight miles below Bulcha Pass; and as the Doongpoo authorities might by chance have made a dash at me, being not above one day's riding distant, I was compelled to agree upon returning towards Melum on the morrow.

2nd June.—Started at 5h. 22m. A. M., intending to have a look at the ground where I killed the *burrall* on the 31st ultimo. Had nearly two hour's fag, and saw not one *burrall*, they appearing to have deserted the spot. I saw altogether five or six brace of snow pheasant, but did not attempt them, being after *burrall*. Had I even done so, I doubt much if I could have got a shot, for they were excessively

watchful. Feeling fatigued from yesterday's hard work, and a very bad night's rest, I mounted my jooboo, and sent the shikaree and boy before to look out; about 8 o'clock one of them returned, having seen four *burrals*. I went on and saw them on a bare hill side, took a long creep to get near them, and found no trace of them when I came up. The boy had, however, seen two go up the hill, and two over the ridge to some cliffs in advance, just East of Chingoor. I therefore ascended again over a rough landslip of hard stones to the crest of the cliff, which was formed of sheets of yellow sandstone and loose masses of the same. This stone so exactly resembled the color of the *burrals*, that I saw nothing; and I was going to look further over, when my boy gave a whistle to recall me. He had seen numerous *burrals* lying about ninety yards in front of me, but the whistle startled them, and the first I saw was then jumping up. I took the best shot I could at one running, and broke his hind leg well up, but did not stop him. The noise alarmed four others that were lying down a little to my right, not fifty yards off, and here another barrel would probably have ensured me a certain hit; but before I could get my double gun, one barrel of which had ball, they were a good 100 yards off, and my shot missed. The herd, consisting of from twenty to twenty-five or thirty, now slowly ascended the ridge of hill to my left, and as I had no chance of seeing them again, I took four or five long shots at them with my rifle as fast as it could be loaded. I might have killed one, as for two shots the distance was not above 200 to 250 yards; but my bullets went only very near, and I could do no damage. All search after the wounded one was ineffectual from the terrific nature of the ground, and a little blood was all the result. My shikaree quite frightened me by some of the sheets of rock he ascended and descended, until I called him away. Some two hours were lost after these *burrals*, and it was 12h. 50m. before we reached the crest above (South of) Chingoor. Thence a quick descent down Kalee Mutteea Churhai to Doldunkur Nuddee by 1h. 35m., thence along the Nuddee to its junction with the Lonka, which latter being much swollen, we halted here (where the Lama was on 29th ultimo,) at 2 P. M. instead of going on to Topee Doonga, which was 18 minutes' travelling to the West, though here grass was very scarce and wood not procurable. The snow in the Nuddee had melted very much since I passed up, and

Oonta Dhoora looking South from the ridge above Chingnoo
i.e. the crests of Kalee Mooltee Chinhaie



The intermediate hills are chiefly covered with snow but their tops bare

Loose stones rising up to hills on either side, immediately in front is the Kalee mooltee Chinhaie descent, looking southwards, which would require deep shading to convey any idea of. Probably from where I stood to the top of the Pass the direct distance may be 10 miles. A few ammonites are to be found along the Kalee mooltee Chinhaie



Looking north from Crest of Kalee mooltee Chinhaie, but this is more of a map than a sketch as beyond the first low hills north of Chingnoo only the Bulcha range is seen from where I stood on the Crest. ☀ the intermediate river being shut out from view by the said low hills, the other river also is not visible northwards after Junction of Chingnoo stream with it,

some of the snow beds were barely practicable, with no other track except under great difficulty.

The new detachment of troops gone to Ladhak is only 1,000 instead of 5,000, and they are commanded by the chief who takes credit for having annihilated Zorawur Sing last year. These troops are from Gurtope and not Lhassa, though I understand they came from Lhassa some months ago; and there are perhaps 5,000 more ready to advance from Gurtope, if this 1,000 fail. They will get a lesson probably, when Bustee Ram arrives with his Seikhs.*

3d June.—Started at 4h. 40m. after a bad night's rest, †. Ther. 42° in sleeping tent, morning very mild with dense clouds and haze. Route lay up right bank of Laukon river, and was much easier than that from Topee Doonga would have been. Ascent gentle, except the first part. Road over snow-beds and sides of landslips. At 6h. 15m. reached a small stream coming from East, which may be of considerable size at some time of the year, judging from its bed. At 7h. 26m. at the foot of Oonta Dhoora, and at 8h. 17m. reached the crest, walking up leisurely. On the Pass it was unusually mild—no wind—and haze cleared away; so that I had a good view of whatever is visible from the top. Ther. in shade 39½°. Boiled at 182°. Halted till 9h. 20m., and during the interval, I attempted a sketch of views, north and south, which I must get completed hereafter.‡ Ate a good quantity of biscuits, and drank the health of the Queen and friends.

There is a small sheet of blue water a little west of the foot of the Pass on the north side, but I believe it dries up at some period of the year. On the *dehta*,§ two small sticks had been set upright. These were fringed down the south side with what I really took to be fine white cloth, but it turned out to be ice, from the congelation of moisture driven past by the bitter cold north wind. I saw one young swallow flitting about on the crest; what on earth was it doing there?

I have made a mistake I believe regarding the three hills North East of Oonta Dhoora. The nearest is Gentee, but Saour is Eastward of

* By last account, the Chinese Thibetan forces had been totally routed at Ladhak by the Seikhs, October 14, 1842.—J. H. B.

† Probably the rarity of the air may have had a greater effect on our traveller than (in his note on Manson's Journal) he seems inclined to admit.—J. H. B.

‡ See Plate.

§ Hillock or heap of stones for offerings and worship.

that again, and the name of the second I do not know, (unless it be "Lusher.") Chingoor may be the name of the third, or merely of the ridge above Chingoor. Commenced the descent at 9h. 20m., reached foot at 9h. 55m., Doong at 12h. 15m., breakfasting place of 28th ultimo 2h. 30m., halted till 3h. 15m., and then on to Melum, where I arrived at 5h. 40m., quite exhausted by the 13 hours' travelling. At the foot of the Pass, the snow was melting rapidly, and large fissures were forming, snow very soft, sun unpleasantly hot. Goonka river much swollen since I passed up, and the snow-bed, by which we crossed to Melum side falling in rapidly. My face and heel were exquisitely painful, and I was delighted to get back to Melum for my bed. The price of a yak is from eight to twelve rupees; they carry less than a jooboo, and sometimes turn upon their drivers, or rush down hill when urged beyond their patience; a jooboo never does this, carries $1\frac{1}{2}$ to 2 maunds well, lives to 30 years or so, and works 12 to 14 years. Dhan Sing is my authority. In descending the Pass yesterday, I heard the fall of an avalanche somewhere in the vicinity; the noise was that of a loud and continued peal of thunder; the Bhooteas have stories of men and goats being lost in snow storms and avalanches. One I heard to-day was of 4 men with 500 sheep and goats lost during a snow storm of 7 days near Sungon. Three men escaped back to Melum, and the tribe of Bhooteas who suffered this heavy loss forswore the Thibetan traffic for ever. Now-a-days, people seem to have become acquainted with the seasons and weather; for accidents very rarely occur.*

* A short time after Lieut. Weller's departure from the Bhoote Mahals, I received an official report of two Bhooteas with 8 or 10 loaded jooboos and some sheep being lost in a snow storm. Accidents of this kind are most frequent during the months of May and October; in the former month from the fall of avalanches, both of snow and rocks occurring in the middle of the day when the sun becomes powerful, and the masses on the peaks become loosened, in the latter month from the first falls of new snow at the commencement of the winter surprising parties who attempt for the sake of profit to prolong the season of traffic across the Passes. In October 1837, the Netee Pass was quite open on the 11th, on the 12th it was entirely closed by a sudden snow storm of which I was an eye-witness. The village of Macca near Budrinath has been twice carried away by avalanches since 1815, and the pilgrims who venture to Keddernath too early in the month of May, are sometimes surprised by avalanches falling in the three miles between Gowree Koond and the temple; the only signs of them left being sticks and shoes scattered about the snow. Common caution as to choice of season would save all such accidents to the pilgrims; indeed, accidents are yearly becoming of rarer occurrence.—J. H. B.

*A perpetual Moon Table, By Capt. ROBT. SHORTREDE, 1st Assist.
G. T. S.; F. R. A. S. &c. With plates.*

I now send an account of a Table, which I have constructed for finding the Moon's age for any date, past or future, somewhat similar to that lately published for finding the week days.

If the Moon's course were completed in an even number of days, and with a uniform motion, its age and the time of any particular phase would be found as readily and surely as the day of the week; but as neither of these conditions holds good, and as two lunations are scarcely ever completed in equal times, if we wish to be correct, we must either make a calculation at length, or avail ourselves of those already made, or else use some other method by which correctness is made to give way to convenience.

The rule commonly given in books of Astronomy for finding the Moon's age is by no means very simple, as it requires us first to know the Golden Number and the Epact. The rule for finding the Golden Number is tolerably simple, as also is that for the Epact at present, but for this, after 1900, a new rule is necessary, which as given in Barlow's Dictionary, runs thus: 'Divide the centuries of the given year by 4, multiply the remainder by 17; then to this product add 43 times the quotient, and also the number 86, and divide the whole sum by 25, reserving the quotient: next multiply the Golden Number by 11, and from the product subtract the reserved quotient, so shall the remainder after rejecting all the 30's contained in it, be the Epact sought.' This rule is such that few persons will be inclined to use it, except in cases of urgent necessity, and even by means of it the Moon's age may fall on the wrong day, as no account is taken of the great Equations depending on excentricity, which may amount at a maximum to 14 hours on either side of the mean time given by the Tables.

The Table now given shews at once, without calculation, and with scarcely any trouble, the mean times of New and Full Moon, &c., as also the Moon's age to the nearest day, and by means of another similar card for the two principal corrections, the true times of New and Full Moon may be found within an hour or so of the results, which would be found by a detailed calculation.

In constructing this Table, I have used methods of approximation more or less exact, according to the exigency of the case, so as to retain as much correctness as is consistent with convenience, and also to allow of the admitted errors being corrected in the least troublesome way I could devise.

A mean lunation consists of 29d. 12h. 44m. 03s.* If this be supposed to occupy the circumference of a circle, it will, when divided into days, have 29 parts each equal to a day, and a space corresponding to 44m. 03s. more than half a day. It will, however, be vastly more convenient to divide the circumference into $29\frac{1}{2}$ equal parts, each of which will correspond to 89.593s. or about 1m. 30s. more than a day, but in ordinary cases of finding the Moon's age, or time of New Moon, &c. the small quantity by which the subdivisions exceed the exact value of a day, may be disregarded without inconvenience.

The days of the month are written in order from right to left on the inner card, which of course contains $29\frac{1}{2}$ divisions, corresponding to those of the lunation; the days beyond 29 being written intermediately to those at the beginning of the month.

As January contains 31 days, or nearly $1\frac{1}{2}$ day more than a lunation, the next month February is written to the left of January by a corresponding quantity. February having only 28 days, falls short of a lunation by nearly $1\frac{1}{2}$ day, and hence March is written to the right of February, and would fall exactly under January if the lunation contained exactly $29\frac{1}{2}$ days. In like manner April falls nearly under February; and May near half a day to the left of April; and so on, each month falling to the left by a quantity corresponding to the Epact of the preceding month. If the lunation contained exactly $29\frac{1}{2}$ days, December would fall $9\frac{1}{2}$ days to the left of January, but this must be diminished by 11 times, 44m. 03s. = 8h. 04m. 33s., leaving 9d. 3h. 55m. 27s., and if this be estimated by the scale of the Table, it

* In most modern works the lunation is stated at 29d. 12h. 44m. 02.8s. This number is given under *Moon* in Barlow's Dictionary, while on the opposite page a *lunar month* or *lunation* is stated at 29d. 12h. 44m. 03s. 11t. This latter quantity agrees best with the ancient observations, and the former quantity with the modern. The quantity here used is pretty nearly the mean of the two, and is that usually given in common works. The difference of 2-10th of a second on each lunation amounts in 4000 years to about 2h. 44m. 54s., and therefore in a Table like the present, scarcely requires farther notice.

should be farther diminished at the rate of 89.50s. daily, which amounts to 13m. 40s., giving a result of 9d. 3h. 41m. 47s. It would simplify the apportionment of this difference, without giving rise to sensible error on this scale to reckon it at 45m. 1-16th of half a day on each month. The exact position of the month marks, are in half days as in the following Table :—

January, {	0·00	May, . . .	55·2	September, 45·63
	2·00			
February, {	56·09	June, ..	52·3	October,.. 44·70
	58·09			
March, ..	00·12	July, . . .	51·45	November, 41·79
April,	56·21	August .	48·54	December, 40·86

The outer card contains the years of a century in their order, from left to right, at intervals, corresponding to the annual Epacts.

A tropical year consists of 365d. 5h. 48m. 51s.* nearly, and in 12 lunations there are 354d. 8h. 48m. 36s., the difference between which is 10d. 21h. 00m. 15s., which may be called the tropical Epact. If the Calendar were kept in tropical years, this would be the constant annual Epact; but in order to correspond with the Calendar years, this tropical Epact should be diminished by 6h. for 3 years, and in the 4th year should have a day more than in the three preceding. They would then consist of 10d. 15h. 00m. 15s. and 11d. 15h. 00m. 15s. respectively. To reduce these Epacts to the scale of lunation days, they must be diminished at the rate of 89s., 50 daily, or 15m. 40.93s. and 17m. 10.44s. or 15m. 58.33s. at an average: these become thus 10d. 14h. 44m. 34s. and 11d. 14h. 43m. 04.5s. These would be the quantities by which the years on the outer card advance to the right of those preceding them, if it were true that a day is gained in every 4 years; but the error on this supposition reduces the average correction as above to about 4m. 50s. on each year.

The following considerations will, however, somewhat simplify the mode of writing the years in their order. In 1236 lunations, there are 36,499 days, 19h. 25m. 48s., in a Gregorian Century there are 36,524 days; being in excess of the lunations by 24d. 4h. 34m. 12s. This may be called the Gregorian century Epact. If the years of the century

* This quantity is given with some variation by different Astronomers. The above is the value towards which Delambre seemed to incline. The difference of a second or two is of no importance as regards the Table.

be written out on the card at intervals of 10d. 15h. and 11d. 15h. a Gregorian Century will consist of 1236 lunations, 24 days and 12 hours. In order to compare these results, the 24d. 12h. must be increased at the rate of 89.593s. daily, or the 24d. 4h. 34m. 12s. must be decreased at the rate of 89.500 daily, to have them in common or lunation days respectively. The latter will be the more convenient, as the adjustment is to be made on the card which has lunation days; the correction to be subtracted from 24d. 4h. 34m. 12s. is 36m. 05s. which leaves 24d. 3h. 58m. 07s. as the Gregorian Century Epact on days of $29\frac{1}{2}$ to a lunation, the difference between which and the 24d. 12h. given by the card or 8h. 01m. 53s. is the error generated in a Gregorian Century by using the Epacts 10d. 15h. and 11d. 15h. Now this quantity is as nearly as may be $\frac{2}{3}$ or 67 p. c. of half a day, and being distributed over the whole century, becomes $\frac{2}{300}$ p. c. of half a day for each year. The odd 15h. of the Epact is half a day, and $\frac{1}{4}$ or 25 p. c. of half a day. Hence counting by the 59 half days, and beginning at 00 the year, 01 will stand at $21.25 = \frac{2}{3} = 21.24$ to the right of zero: the year 02 at $2(21.25 - \frac{2}{3}) = 42.49$ and the year 03 at $3(21.25 - \frac{2}{3}) = 63.73 = 4.73$ after rejecting 59 or a whole circumference. In this manner the following Table was made:—

TABLE I.

Year.	Place on the Card.	Year.	Place on the Card.	Year.	Place on the Card.	Year.	Place on the Card.	Year.	Place on the Card.	Year.	Place on the Card.
00	57.00	19	57.62	38	58.25	57	58.87	76	0.49	96	20.36
	00.00			39	20.49	58	21.11	77	21.74		22.36
01	21.24	20	21.87	40	43.73	59	42.36	78	42.98	97	43.60
02	42.49	21	43.11	41	5.98	60	6.60	79	5.22	98	5.85
03	4.73	22	26.60	42	27.22	61	27.84	80	28.47	99	27.09
		23	49.21	43	48.46	62	49.09	81	49.73	100	48.33
04	27.97	24	49.84	44	63	63	11.33	82	11.93		50.
05	49.21	25	12.08	45	12.71	64	83	83	33.20		
06	11.46	26	33.35	46	33.95	65	34.57	84	56.44		
07	32.70	27	54.57	47	55.19	66	55.81	85	18.68		
08	55.95	28	17.44	48	17.44	67	18.06	86	39.93		
09	18.19	29	40.06	49	40.68	68	39.30	87	2.17		
10	39.43	30	2.30	50	2.92	69	3.55	88	25.41		
11	1.68	31	23.54	51	24.17	70	24.79	89	46.66		
		32	46.79	52	45.41	71	46.03	90	8.90		
13	46.16	33	9.03	53	9.65	72	8.28	91	30.14		
14	8.41	34	30.27	54	30.90	73	31.52	92	53.39		
15	29.65	35	51.52	55	52.14	74	52.76	93	15.63		
16	52.89	36	15.76	56	14.38	75	15.01	94	36.87		
17	15.14	37	37.00	57	35.63	76	36.25	95	58.11		
18	36.38				37.68	77	57.49	96			

The years being written in their places shew very plainly the Metonic Cycle of 19 and the Calippian of 76 years. That of Meton is well known as the Golden Number. Cycles of 11, 8, and 3 years may also be observed, and the order of their succession is worthy of being kept in mind as helping to find readily the place of any required year on the card. A little practice will shew the value of this remark, and besides it, no other seems necessary.

The middle card has on its inner circle the days of the Moon's age, and the known characters for New and Full Moon, and for First and Last Quarters ; on the outer circles are the full centuries of Old and New style. The manner of writing the days of the Moon's age is obvious enough, and requires no explanation. That of writing the full centuries is now to be shewn.

The Gregorian Century Epact being 24d. 4h. 34m. 12s., the Julian Epact is 25d. 4h. 34m. 12s., and by intervals corresponding to these times will these centuries follow each other towards the right. But as these quantities are much greater than half a lunation, they may be subtracted from 29d. 12h. 44m. 03s., and the remainders 5d. 8h. 09m. 51s. and 4d. 8h. 09.51s. will be the intervals of the successive centuries towards the left. These being in common time are to be reduced to that of the card at the rate at 89.50s. daily, as formerly shewn, when they become 5d. 8h. 01m. 53s. and 4d. 8h. 03m. 22.5s. respectively. If these be taken at 5d. 8h. and 4d. 8h. by neglecting the small excess the error in 400 years will be 9m. 01.7s. and in 4000 years only 1h. 30m. 27s. For the last 4000 years this error would be rather convenient than otherwise, as tending to neutralize that arising from neglecting the acceleration, which for the same period, as already stated, would be about 2h. 44m. 54s. the difference between which and the quantity now omitted being 1h. 14m. 27s.*

New style centuries may be carried forward at the same rates of 5d. 8h. and 4d. 8h. as far as we please, (though *in point of fact* they are not required before the full century 15) ; as in the following Table, to which if thought necessary may be applied corrections for the error 0031 here admitted, as also for the acceleration.

* It is hardly necessary to remark, that we have no recorded observations so far back as 4000 years, and that many of the earliest recorded are uncertain to half an hour or more. The Table may therefore be depended on farther back than is likely ever to be required.

TABLE II.

Cent.	N. S.	O. S.	B. C. or —
0	17.29	13.29	13.29
1	6.62	4.62	21.96
2	54.96	51.96	30.62
3	44.29	46.29	39.29
4	35.62	37.62	47.96
5	24.96	28.96	56.62
6	14.29	20.29	6.29
7	3.62	11.62	14.96
8	53.96	2.96	23.62
9	43.29	53.29	32.29
10	32.62	44.62	40.96
11	21.96	35.96	49.62
12	13.29	27.29	58.29
13	2.62	18.62	7.96
14	50.96	9.96	16.62
15	40.29	1.29	25.29
16	31.62	51.62	33.96
17	20.96	42.96	42.62
18	10.29	34.29	51.29
19	58.62	25.62	0.96
20	49.96	16.96	9.62
21	39.29	8.29	18.29
22	28.62	58.62	26.96
23	17.96	49.96	35.62
24	9.29	41.29	44.29
25	57.62	32.62	52.96
26	46.96	23.96	2.62
27	36.29	15.29	11.29
28	27.62	6.62	19.96
29	16.96	56.96	28.62
30	6.29	48.29	37.29
31	54.82	39.62	45.96
32	45.96	30.96	54.62
33	35.29	22.29	4.29
34	24.62	13.62	12.96
35	13.96	4.96	21.62
36	5.29	55.29	30.29
37	53.62	46.62	38.96
38	42.96	37.96	47.62
39	32.29	29.29	56.29
40	21.62	20.62	5.96
41	10.96	11.96	14.62
42	0.29	3.29	23.29
43	48.62	53.62	31.96
44	39.96	44.96	40.62
45	29.29	36.29	49.29
46	18.62	27.62	57.96
47	7.96	18.96	7.62
48	58.29	10.29	16.29
49	47.62	1.62	24.96
50	36.96	51.96	33.62

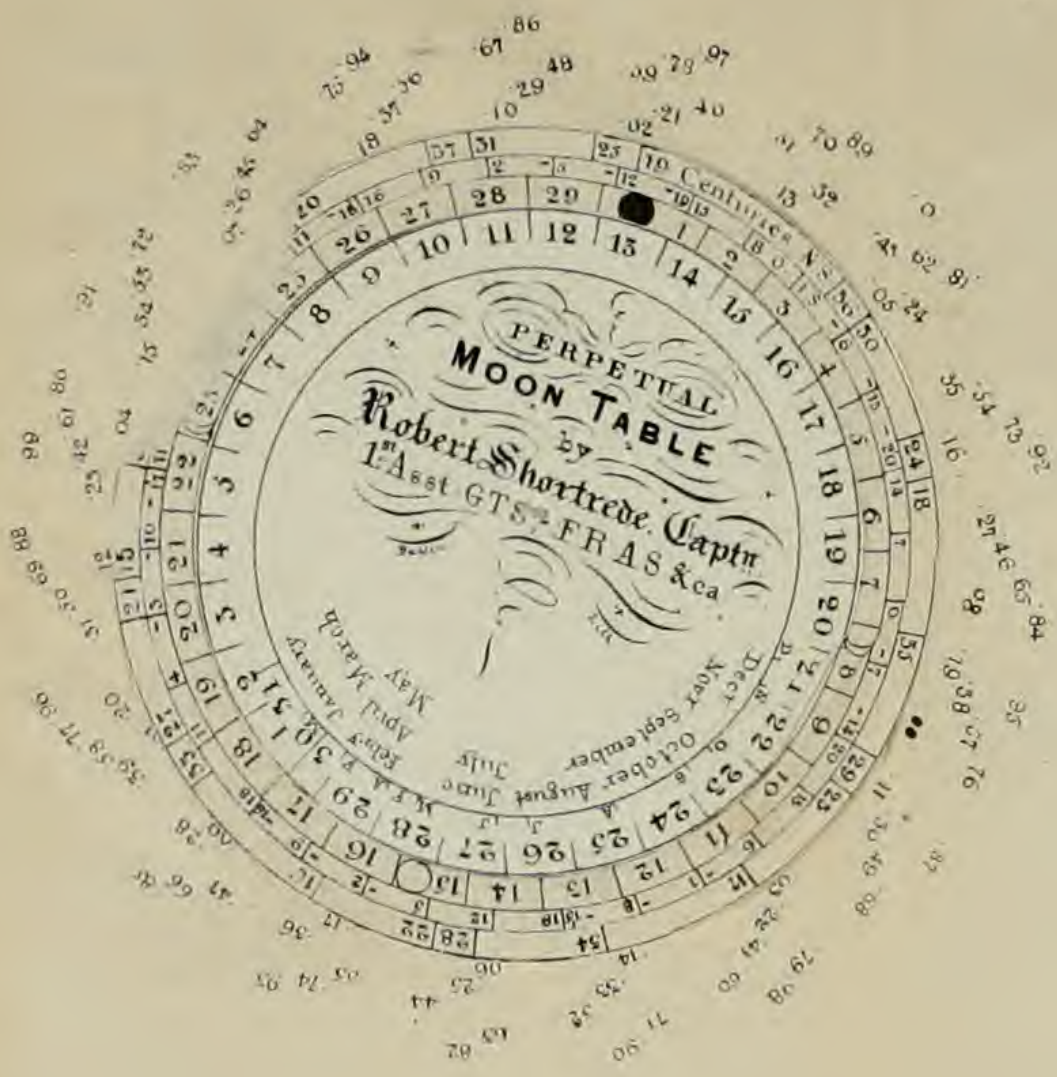
This table requires but little explanation. The first column shews full centuries. That marked N. S. shews the place in half days on the circumference of the card, of the mark for adjusting the N. S. centuries to the mark of ●● on the outer card. In like manner the columns headed O. S. and B. C. or — shew the places of the marks for adjusting the cards by, in centuries of O. S., or in those before the Christian era.

These observations may suffice for shewing the general construction of this card; the reason for giving the century marks their particular position remains to be stated.

According to the Synopsis of Astronomy in Barlow's Tables, (which, and his Dictionary, were the only books of reference within my reach when arranging this Table) the Moon's mean longitude on the 1st of Jan. 1801, was 3s. 21° 36' 42", or 111° 36' 42" that of the sun being 9 10 09. 13, or 280 09 13 Hence the moon was then distant }
from the sun, } 191 27 29

or 11° 27' 29" past the full. This at the rate of 29½ days to a lunation, gives the Moon's age on the 1st of January 1801 as 15° 66' 11". Barlow's data being taken from Laplace's Systeme du Monde, are probably adapted to the meridian of Paris. The difference between Paris and Greenwich is 9m. 21.5s. corresponding in lunation days to .00643. Greenwich being to the west of Paris, this must be added to

15° 66' 11", in order to have the Moon's mean age at Greenwich on 1st January 1801. As for the convenience of keeping the same digits throughout a century, I reckon from 1800, the Epact for a year of 365 days must be deducted; this is 10d. 15h. 11m. 24s. which reduced at the rate of 89.50s. daily, becomes 10d. 14h. 55m. 33s. = 10d. 5219, and this taken from 15d. 66 11 + 00643, leaves 5d. 14 56 as the Moon's mean age in lunation days at Greenwich on the 1st January of 1800. In half days this is 10.29, as in the Table.



The outer Card has the odd years of a Century in their order.
 The middle Card has on the Outer Circle the full Centuries of New Style
 and on the middle Circle those of Old Centuries B.C. are marked -
 The inner Circle has the days of the Moon's Age -
 The inner Card has Months & days of the Month.

Set the Right Circle upon the middle year of the current year of the Moon's Age -
 For dates B.C. add one to the current year of the current year of the Moon's Age -
 then as the current year of the current year of the Moon's Age -
 In leap years use the current year of the current year of the Moon's Age -
 The Marks -
 Note This Table is adapted to the current year of the Moon's Age -
 The phases opposite that have at Greenwich
 show the phases opposite that have at Greenwich
 the green odd year
 of that century take the complement to 101 of
 the January & February of the century then opposite the day of the Month is the
 on the outer card bring the Month marks
 the outer card bring the Month marks



It is not distinctly stated by Barlow, whether the era given by him begins at noon or midnight, but as the French Astronomers about that time attempted to introduce civil reckoning, and as the supposition of this appears to agree pretty well with some old Tables, like Ferguson's, which I have lately got hold of, I adopt it, subject to any correction which better authority may hereafter shew to be requisite.

Generally the marks on the card are put on the left of the numbers to which they belong. On the outer card Leap years have two marks, that beside which the number is written answering for the months from March onwards, and the other answering for January and February.

The use of this Table is very much like that of the Table for week days. The full century mark on the middle card is to be set to that of the ● ● on the outer. The given month-mark on the inner card is then to be brought into line with the mark of the current year on the outer: when opposite the days of the month will be seen those of the Moon's age. Opposite ● will be the day of New, and opposite ○ the day of full Moon; and opposite) and (the days of the first and last quarters.

The times thus found are of course the mean civil times at Greenwich; but there is no difficulty in reading the Table in astronomical time, as any person will perceive.

In order that the Table may serve for dates before the Christian era, it is to be observed that the year 1 B. C. may be considered as the year ○ of the Christian era, or the hundredth of the century — 1. Hence this rule. Add 1 to the given century B. C. and reckon it —; then to the complement to 100 of the odd year add 1 and reckon that as the current year of the century. In this way the year 721 B. C. is the 80th of the century—8; and may conveniently be written $\overline{8}$ 80, the mark — applying to the full century only, like the negative index of a logarithm.

ROBERT SHORTREDE.

November, 1841.

The present Table in conjunction with the one for week days will give Easter for ever with less trouble than by any other method at present known. All that need be done is, to set the Table to March in any given year, and if Full Moon falls after the 21st, find by the

other Table the corresponding week day ; the first Sunday after Easter. If full Moon in March falls before the 21st, set the Table to April, and proceed as before.

Professor Gauss has given a formula for finding Easter without using the Epact, as may be seen in Delambre's Astronomy. It is as follows :—

Divide the given number of the year by 19, and let a be the remainder.

Divide the given number by 4, and let b be the remainder.

Divide the number by 7, and let c be the remainder.

Divide $(19a + M)$ by 30, and let d be the remainder.

Divide $(2b + 4c + 6d + N)$ by 7, and let e be the remainder.

Then Easter-day will be the $(22 + d + e)$ of March or the $(d + e - 9)$ of April. For the Julian Calendar, this rule is general, where $M = 15$ and $N = 6$ always; it requires a correction for the Gregorian Calendar. If the calculation gives the 25th or 26th of April, take away seven days.

The following Table gives M and N in the Gregorian Calendar as far as 2,500.

	M	N
From 1582 to 1699	22	3
1700	1799	23 3
1800	1899	23 4
1900	1999	24 5
2000	2099	24 5
2100	2199	24 6
2200	2299	25 0
2300	2399	26 1
2400	2499	25 1

On the Treatment of Geometry as a branch of Analysis. By S. G. TOLLEMACHE HEATLY, Esq.

1. The clothing of purely geometric principles in analytical language—in other words—the conduct of elementary geometric inquiries by functional equations is historically connected with the subject of my former papers. Legendre's endeavour to prove on functional principles, that the three angles of a triangle are equal to two right angles, and thence to deduce the theory of parallels will readily occur to the memory of those familiar with mathematical records. But the first step in developing the idea may be traced higher, and I think successfully, to a yet more illustrious origin.

2. In the 2nd volume of the *Memoirs of Turin*, there is a demonstration, purporting to be by M. Daviet de Foncenex, of the parallelogram of forces. Assuming two forces, each equal to a , acting at an angle θ and denoting their resultant by z , he states z to be a determinate function of a and θ , and that this expression must by the principle of homogeneity be of the form

$$z = a f(\theta)$$

It follows from thence, that the angle θ remaining constant, z is always proportional to a . "On pourrait," continues the author, "de meme demontrer par cette methode d'une maniere directe et fort naturelle plusieurs theoremes sur la proportionalité des cotés des figures et un grand nombre d'autres propositions de geometrie et de mecanique."

This essay, I have said, bears the name of Foncenex, but I am induced to attribute it to Lagrange, on the foundation of some curious facts revealed by Delambre in his eulogy on that mathematician, (*Annals of Philosophy*, vol. III). It is there stated that Foncenex received the analytical part of his memoirs from Lagrange, and only performed the task of developing the reasoning on which the formulas depend.* Parts of this very memoir were afterwards reclaimed and re-written by Lagrange, and the beauty and boldness of the portion we are considering, betray I think undeniable traces of being *ex ungue leonem*, even without the collateral evidence. The conclusion of this historiette is amusing. In recompense for the science displayed in these identical memoirs, Foncenex was appointed Minister of Marine by the Sardinian monarch, an honour which separated him from Lagrange, and he ceased in a short time to take interest in mathematical pursuits. Too simple minded to discern between cause and effect, Montucla laments the unaccountable apathy which Foncenex thenceforward displayed towards researches which had given him profit, and might have added honour. Certain it is, the Minister died and made no sign anent the "plusieurs theoremes de geometrie et de mecanique."

The essay, which we may therefore attribute to Lagrange, is quoted by Legendre at the foot of his celebrated second note, as doing for me-

* This, by the way, is the manner in which Göthe is said to have accounted for the fertility and variety of Scott's pen. Sir Walter was supposed to have sketched the plot and skeltoned the chief characters, the whole being then worked up by younger artists at the foot of this Gamaliel! A delicious theory on fertility and variety by one of the most fertile and varied intellects of the age!

chanics what he had done for geometry. And when we take further into account, the long and early intimacy between the two analysts, (Legendre having edited the first edition of the *Mecanique Analytique*), it becomes highly probable that Lagrange was the first who conceived the idea of condensing the scattered truths of geometry into a few families of formulæ, as he did those of mechanics: and that Legendre caught the spirit of such peculiar reasoning from his friend, his own original genius enabling him to apply it with the success he did.

3. Legendre's mode of procedure may be put in the following manner. If from the ends of a given base we draw two straight lines making given angles with that base, we have performed definite operations giving a single fixed result. If this result prove to be a triangle, then the triangle being sole and invariable, its elements must all be determinable by calculations founded on the data which produce that invariability; viz. the base and the base angles. Both the data and the quæsitæ can only appear in these calculations in the shape of numbers, and therefore either as ratios *inter se*, or ratios involving some constant unit of measurement. Now the angles have such a constant unit in the right angle, but the sides have not, there being no natural unit of linearity. The consequence will be, that the sides can only appear in the calculations as ratios *inter se*, but the angles may appear either as ratios *inter se*, or as fractions of a right angle. Now among the elements of the triangle which are determined by the base and base angles is the third angle, it will follow therefore that there is some form of calculation connecting this third with the data. But of these four the angles easily enter the calculation, while we do not see how the side can, since there is no other line necessarily involved in the matter. We conclude therefore that the side cannot enter, and therefore that the third angle is determinable only by help of the other two. Hence, whenever two angles in each of two triangles are identical, each to each, the third angles are also identical.

The sequel of this demonstration is geometrical. By dropping a perpendicular on the hypotenuse from the right angle, we divide a right angled triangle into two others, each of which has two angles equal to two of the primitive triangle. They are consequently equiangular to the primitive triangle and to each other, whence it is seen, that the two acute angles of the large triangle are together equal to the right angle,

and hence all three to two right angles. The proof is then extended to triangles in general, by dividing them into right angled triangles.

4. The publication of this train of reasoning excited a discussion unprecedented in the cold calm regions of science, and one which assumed a character of acrimony, that can only be accounted for by the political antipathies which extended even to the schools of mathematics. Ivory, Leslie, Playfair, Brewster, Maurice, Nieuport, and the great author himself, took prominent parts in the controversy. It is not my intention to raise, or lay the ghosts of departed objections. Stated in the manner I have done, divested of the appalling formalities of a functional investigation, there are only two points in Legendre's proof over which the reader will pause for an instant.

The first is, why will geometric determination afford any grounds for numerical calculation? This is easily answered. The remaining elements being geometrically given, their proportions to the data are given, that is, a series of numbers being assumed for these last, a series of numbers for the rest are found. Hence the necessity of supposing a numerical process connecting the consequent numbers with the assumed ones.

The second is of a graver character. It is suggested at the place where, having settled that the calculation of the third angle involves only the magnitudes of the other two, we conclude that two triangles, having two angles equal each to each, will also have the third angles equal. This conclusion is evidently founded on the assumption that there is an invariable formula of calculation for *all* triangles, connecting the third angle with the other two. The question is, having assured ourselves that the triangle ABC has a formula connecting the angle C with A and B, what grounds have we to suppose that the *same formula* will be applicable to A'B'C'? The fairest mode of meeting the query I conceive to be this. When a base is laid down and lines are drawn making given angles with it, we perceive intuitively that the system is fixed. The magnitude of the base and base angles is not a constituent of this fixity. They may vary, but the conception of *determination* remains not the less distinct. To express this *fact* analytically, we must say that the magnitudes in the triangular system vary *inter se*, but the laws which connect their respective variations are invariable and universal. Hence we conclude that every geometrical

figure has its peculiar but invariable formula of calculation. The geometrical definition prescribes an invariability of form as regards *figure*: when we transfer the question into the domains of analysis, we introduce a consideration equivalent to this, it is the invariability of form as regards *calculation*.

Legendre's own attempt to clear up this point is not even specious, although while his impregnable positions were hotly attacked, the weakest escaped all but the practised eye of Sir James Ivory. He had to prove that the formula by which the third angle is calculated from the base and base-angles applies to all triangles. He imagines two triangles, one constructed with the data a, B, C , and another with a', B, C , having if possible different formula, the first say ϕ , the second ϕ' . Then considering a' to vary to a , he obtains a third triangle. But this third triangle has the same data as the first, and its third angle is therefore equal to that of the first. Hence it must be calculated by the same formula. *But the formula of the third is that of the second*, that is ϕ' , hence ϕ & ϕ' are the same formula. The words in italics beg the question glaringly: if the variation of an element can make a formula vary (which is to be disproved,) then the change of a' into a gives the third triangle some new formula more or less different from ϕ' : the principle of superposition shews that it is identical with ϕ , hence ϕ differs from ϕ' , and there is no absurdity forced upon the adversary.

5. The geometrical weight of this flaw is of importance and great interest. It was pointed out by Sir J. Ivory, that to assume a' to change to a while the base angles remain B and C as before, is equivalent to drawing from the ends of a base a , lines making with it angles equal to those of a given triangle $A' B C$. To assume further that the formula of $A' B C$ will apply to the new figure is to assume, that the new lines will form a triangle with the new base a . The double assumption amounts therefore to stating, that two lines making given angles with a third will always meet, the only thing known regarding those given angles being that they are less than two right angles; since they are angles of a given triangle. This is nothing more nor less than Euclid's axiom, and therefore Legendre's process involves the assumption of that axiom. The analytical investigation therefore rests on an assumption, that of the *invariability of formula* as distinguishing a defined geometrical figure, which no skill can do away

with, and which must either be the subject of postulate, axiom or demonstration.

6. To his striking presentation of the 32d Prop. Legendre added the "plusieurs theoremes sur la proportionalité des cotés des figures," yet notwithstanding the intense interest excited by the publication, the violent discussions to which it gave rise, and the eminent individuals who enlisted themselves on one or other side, it has often appeared to me singular, that no attempt should have been made to develop the whole system of elementary geometry in a concinnous form on the same principles.* Independent of its utility as an introduction to the methods of analysis, the young mathematician would be benefited by seeing grouped together those truths which are nearest related in affinity: he would, in the language of Decandolle, have those nearest in books which are nearest in the order of nature.

7. The only principle on which it would be necessary to base such an attempt would be this: that every defined geometrical figure is the representation of certain invariable formulæ of calculation, the numbers involved in such calculations being represented by the ratios of sides, angles, areas, and the other concomitants of the figure, either *inter se*, or to any homogeneous natural constants that may exist.

8. A triangle then considered analytically will represent a set of formulæ expressing the relation between its sides and angles. If according to the usual notation these be a, b, c, A, B, C , we have

$$F \left\{ a, b, c, A, B, C, K \right\} = 0$$

The letter K , introduced into the formula, stands for the constants which may be furnished by nature. There are, however, no linear constants, but there is an angular one—the right angle; it follows therefore that K can only be a function of the right angle. When therefore the formula assumes a numerical shape, it must be written

$$F \left\{ \frac{a}{b}, \frac{a}{c}, \frac{A}{K}, \frac{B}{K}, \frac{C}{K} \right\} = 0$$

These are all the ratios necessary to be taken into account as

$$\frac{b}{c} \text{ is } \frac{a}{c} \div \frac{a}{b} \text{ and } \frac{A}{B} = \frac{A}{K} \div \frac{B}{K}; \text{ \&c.}$$

* While this has been passing through the press, I have met with in Lacroix an allusion to "M. Corancez qui dans un Memoire fondé sur des principes analogues est parvenu aux theoremes les plus importants de la Geometrie Elementaire."

9. The next step is to inquire whether the expression does not admit of modification, or whether it is essential to the determination of the triangle that five at least of its elements should be given. A short process of deduction informs us, that from the data a, B, C , not more than a single triangle can be constructed, and that therefore those three elements are sufficient for the *complete* determination of all the rest. But it will be quite unwarrantable to say, that even these three are absolutely necessary (every one of them) to calculate any given one of the elements. In calculating A it is at once evident, that two will be quite enough. For the b and c being settled to be foreign to the computation the ratios $\frac{a}{b}$ and $\frac{a}{c}$ cannot enter, and therefore a itself is foreign.

Hence the computation of C depends exclusively on A and B ; or

$$C = F \left\{ A, B, K \right\}$$

Recurring now to the artifice of Legendre or Leslie, it is easy to prove $A + B + C = \pi$. This truth embodies Euclid I. 32, 16, 17.

If there be another triangle $A'BC$ on the same base BC and enveloping ABC ; the angles $A'BC + A'CB > B + C$, hence $A' < A$ (Euclid I. 21). If A then move away from BC , the angle A diminishes and $B + C$ increases. When $A = 0$, the lines b and c do not meet, that is, they become parallel; at this moment then $B + C = \pi$. Hence parallels cut by a third straight line have the interior angles equal to two right angles. The converse is also true since if $B + C = \pi$ the angle A made by b and c must be zero, whence those lines are parallels. (Euclid I. 27, 28, 29, 30.)

10. I now proceed to determine the form of the functional equation representing a triangle. Take a triangle right angled at C , then since it is determinable by the data A, B, c , we can calculate a and b by the help of c, A, B . But C being right, A is calculable from B directly, therefore each side is calculable by the hypotenuse and one of the angles. The formula will therefore contain the ratio of the two lines and the ratio of the angle. Write it thus:—

$$\frac{a}{c} = \phi(A) \quad \text{and} \quad \frac{b}{c} = \psi(A)$$

But the relation of a to its opposite angle A is *symmetrical* with that of b to B , \therefore

$$\frac{a}{c} = \psi(B) \quad \text{and} \quad \frac{b}{c} = \phi(B)$$

Calling the functions ϕ and ψ by the names *sin* and *cos*, we have

$$a = c \cos B = c \sin A, \text{ and } b = c \cos A = c \sin B.$$

These considerations premised, it is easy to determine the general form of the functional equation for any triangle ABC. Drop a perpendicular from A on a , then a will be divided into two parts, the one adjacent to the angle B must as above be equal to $c \cos B$, and the other, adjacent to the angle C must also be $b \cos C$. Hence

$$a = b \cos C + c \cos B.$$

Besides, the perpendicular in the one triangle equals $b \sin C$, in the other it is $c \sin B$; these are therefore equal or

$$b \sin C - c \sin B = 0$$

The conditions of symmetry give us two other pairs of equations.

$$\left. \begin{aligned} a &= b \cos C + c \cos B \\ b &= a \cos C + c \cos A \\ c &= a \cos B + b \cos A \end{aligned} \right\} \dots (\alpha) \quad \left. \begin{aligned} b \sin C - c \sin B &= 0 \\ a \sin C - c \sin A &= 0 \\ a \sin B - b \sin A &= 0 \end{aligned} \right\} \dots (\beta)$$

11. We must remember, however, that the functions *sin* and *cos* are only intelligible with regard to acute angles, since from the consideration of such only they were derived in (10). The formulæ above apply therefore only to acute angled triangles, unless we are able to put such an interpretation on *sin* and *cos* in the case of right and obtuse angles, as will permit us to consider (α) and (β) universal forms.

If (α) and (β) are to apply to all triangles, then if C were a right angle we should have

$$b = a \cos \left(\frac{\pi}{2} \right) + c \cos A \text{ and } a \sin \left(\frac{\pi}{2} \right) - c \sin A = 0$$

But examining a triangle right angled at C, we perceive as in (10),

$$b = c \cos A \text{ and } a - c \sin A = 0.$$

Hence to admit the generality of (α) and (β) we must interpret

$$\cos \left(\frac{\pi}{2} \right) \text{ as } 0 \text{ and } \sin \left(\frac{\pi}{2} \right) \text{ as } 1.$$

If the triangle again were obtuse at C, the perpendicular from A would fall on a produced, hence a would be the difference of $c \cos B$ and $b \cos (\pi - C)$ or $a = c \cos B - b \cos (\pi - C)$. The perpendicular is also in one case $c \sin B$, in another $b \sin (\pi - C)$; or

$$c \sin B - b \sin (\pi - C) = 0$$

Compare these with (α) and (β) supposed to be universal, and it must follow that

$$\cos C = -\cos (\pi - C) \text{ and } \sin C = \sin (\pi - C)$$

are the only interpretations that can be put on the *sin* and *cos* of the

obtuse angle C. We are now in a position to consider (α) and (β) universal.

A little further study of the angular functions will contribute to subsequent condensation. In the triangle right angled at C, we have $a = c \sin A$ and $b = c \cos A$, dividing one by the other

$$\frac{a}{b} = \frac{\sin A}{\cos A} = \text{a function of } A; \text{ specify it as } \tan A$$

$\therefore a = b \tan A$. Now b remaining the same, by inspection a will increase as A increases, therefore $\tan A$ increases with A . This will make $\sin A$ increase with A . For $\cos A$ (being $\sin B$) is related to B as $\sin A$ to A . When A increases, B diminishes; if then $\sin A$ did not increase, $\cos A$ would not decrease, and $\tan A$ their quotient would not increase. This as relates to acute angles; with regard to obtuse ones $\pi - A$ decreases as A increases, hence the \sin will decrease positively, and the \cos increase negatively, the \tan of course increasing negatively.

Table of change with angle increasing.

Angle.	Sin.	Cos.	Tan.
acute	+ increase.	+ decrease.	+ increase.
right	1	0	+ ∞
obtuse	+ decrease.	— increase.	— decrease.

It will follow therefore as the \sin is a function increasing continuously from 0 to 1, and then decreasing continuously from 1 to 0, as the angle increases continuously from 0 to π , that any given value of \sin will be found in two parts of this course on either side of the maximum 1 and thus belongs to two angles A and $\pi - A$; whence there is an ambiguity in determining the angle from the \sin , unless there is something to tell us whether it is obtuse or acute. Also if $\sin B$ be less than $\sin A$, B may be an angle less than the angle A ; but if A be an acute angle, B may also be an angle greater than the obtuse $\pi - A$. The latter case, however, can never occur when B and A belong to the same triangle, since $B + A$ are always $< \pi$ and $\therefore B < \pi - A$. In a triangle therefore if $\sin A > \sin B$; $A > B$, and vice versâ.

With the \cos there is no ambiguity, the sign + or — immediately determines whether the angle is acute or obtuse. If we have

$$\cos A = \cos B, A = B; \text{ if } \cos A > \cos B, A < B.$$

12. We are now in a condition to discuss the geometrical properties *implied* in equations (a) and (β). The first set can be presented in a more convenient form by eliminating cos B and cos C from the first by the help of the second and third.

It then becomes

$$\left. \begin{aligned} &a^2 = b^2 + c^2 - 2bc \cos A \\ \text{symmetrically } &b^2 = a^2 + c^2 - 2ac \cos B \\ \text{and } &c^2 = a^2 + b^2 - 2ab \cos C \end{aligned} \right\} \dots (\gamma)$$

On these two sets of equations, β dependent on the sin and γ on the cosinal forms of the functions, the entire geometry of triangles can be raised with little more difficulty than is experienced in the deduction of a corollary.

Taking the first equation of β, it can be changed to the proportion $b : c = \sin B : \sin C$.* Hence if $b = c$; $\sin B = \sin C$. It will follow that $B = C$ (I. 5) for the ambiguity $B = \pi - C$ cannot take place, since two angles of a triangle cannot both be obtuse. Similarly, if $B = C$; $b = c$ (I. 6). If $b > c$, $\sin B > \sin C$, and therefore B must be greater than C (I. 18). The converse evidently follows (I. 19).

Again, by composition the proportion becomes

$$b + c : c = \sin B + \sin C : \sin C.$$

and compounding this with a proportion derived from the 2d of β,

$$b + c : a = \sin B + \sin C : \sin A.$$

Suppose another triangle A'B'C' on the same base a inclosed within ABC, so that $B > B'$ and $C > C'$ then also $A' > A$. This triangle will also have

$$b' + c' : a = \sin B' + \sin C' : \sin A'.$$

Compounding $b + c : b' + c' = (\sin B + \sin C) \sin A' : (\sin B' + \sin C') \sin A$.

But the second antecedent is entirely greater than its consequent ;

$$\therefore b + c > b' + c' \dots \dots \dots (I. 21)$$

If A' fall on the base, $b' + c'$ will equal a

$$\therefore b + c > a \dots \dots \dots (I. 20)$$

13. Consulting the first of γ. As A increases while acute, cos A decreases, hence a less amount is taken from $b^2 + c^2$ and a consequently increases. When A becomes obtuse, cos A is negative, and the third term therefore additive ; now also then increase of A adds more to $b^2 + c^2$ and therefore to a^2 . Always therefore if b and c remain

* This notation is German, and very expressive, proportion being the equality of ratios.

constant, the increase of A increases a , and vice versâ, the increase of a will increase A , (I. 24, 25).

14. We proceed now to the general determination of triangles. We might first fix the conditions necessary to determine them in individuality, and then in species as Euclid has done; but it will be more consonant to the spirit of analysis to obtain the most general first. Dividing the equations (γ) by c^2 and (β) by c and writing $\frac{a}{c}$ as m and

$\frac{b}{c}$ as n , we have

$$\left. \begin{aligned} m^2 &= n^2 + 1 - 2n \cos A \\ n^2 &= m^2 + 1 - 2m \cos B \\ 1 &= m_2 + n^2 - 2mn \cos C \end{aligned} \right\} \text{and } \left. \begin{aligned} n \sin C - \sin B &= 0 \\ m \sin C - \sin A &= 0 \\ m \sin B - n \sin A &= 0 \end{aligned} \right\}$$

From these six equations, each involving three quantities, any two being given, the rest will be determined. The cases will be

First: m and n given or the ratios of the sides. Here the angles are determined by their cosines, and hence no ambiguity can occur. The form of the triangle is known, or its species determined (VI. 5).

Second: m and B given or the ratios of two sides (a, c) and the included angle. Still n being determined by the 2nd of the first set, the rest are determined as in the former case, and no ambiguity is involved. (VI. 6.)

Third: A, B and therefore C given; or the three angles. Here m and n are determined by the first two of the 2nd set, and there is no ambiguity. (VI. 4.)

Fourth: m and A given or the ratio of two sides (a, c) and, an angle opposite to one. In this case C is determined by the 2nd of the 2nd set: the sinal function entering occasions ambiguity. If m be > 1 , a is greater than c and therefore A than C , whence C cannot be obtuse and there is no ambiguity; but if $m < 1$ or a is less than c , there is no way of avoiding the difficulty, unless the species of C be directly given. (VI. 7.)

If now the length of one of the sides be given in addition to the ratio in which it is involved, the triangle will be determined individually as well as in species. This can occur in 1st, 2nd and 4th cases, which produce (Euclid I. 8, 4 and 26) and (Young I. 26). There being no ratio given in the third case, there is no individual triangle determined by the three angles.

15. With regard to the linear properties of parallels. If a straight line cut the sides of a triangle or these produced, parallel to the base, a triangle is formed of the same species, and hence the sides are divided proportionally. The converse is similarly true (VI. 2). The base of the new triangle will also bear the same proportion to that of the primitive.

If now the base angles of the primitive triangle increase, so that the sides approach parallelism, the sides of the two triangles increase without limit, approaching equality as they do so, without limit. Hence when the sides do become parallel, the ratio is one of equality, and the frustrum of the triangle having become a parallelogram, it follows that the opposite sides of a parallelogram are equal (I. 34). If the parallelogram be rectangular, each pair of sides will be the *distances* between the other pair, hence parallels are equidistant.

The two very elegant propositions (VI. 3, A,) are fragments of an entire series relating to the segments of sides by lines drawn from the opposite angles. It is not the intention of this paper to touch on supplemental trains of inquiry, but only to sketch those on which the rest may be scaffolded with ease. The propositions in question may, however, be simply proved thus: If a line be drawn from A to a and making with c an angle called θ , the segment on a between this line and B is $\frac{c \sin \theta}{\sin (B + \theta)}$ & that between the line & C is $\frac{b \sin (A \sim \theta)}{\sin (B + \theta)}$

Their ratio is consequently always $c \sin \theta : b \sin (A \sim \theta)$, and will be reduced to that of $c : b$, when $\sin \theta = \sin (A \sim \theta)$. If the cutting line fall within the triangle, this gives $\theta = A - \theta$ or $\theta = \frac{1}{2} A$; (VI. 3). If without, $\theta = \pi - (\theta - A)$ or $\theta = \frac{1}{2} (\pi + A)$; (VI. A).

16. The area of any plane figure is a function of its sides and angles. But the sides can be projected on two rectangular axes by help of what precedes, hence the area is also determinable by means of these projections and the angles. The simplest area to consider is that of the rectangle, because if the origin be at one of its angles and the including sides be the axes, they are also the projections of the others. The angles are besides equal, and natural constants. Let the ratio of the sides to the linear unit be a and b , and that of the area to the superficial unit be A , then $A = \phi (a, b)$. Inspection and our previous

knowledge inform us at once, that if a be increased p times and b , q times, the area is increased pq times, hence $pqA = \phi(pa, qb)$.

$$\therefore A = \frac{\phi(pa, qb)}{pq} = \phi(a, b).$$

Hence $\phi(pa, qb)$ must be divisible by pq with a quotient independent of pq . Symmetrically therefore it must also be divisible by ab with a quotient independent of a and b ; let the quotient of both divisions be k . Then

$$\begin{aligned}\phi(pa, qb) &= kabpq. \\ \therefore pqA &= kabpq \text{ or } A = kab.\end{aligned}$$

Assuming now as is usual, that the superficial unit is the square on the linear unit, we find k by making $a = b = 1$ (the linear unit) $\therefore A = 1$ (the superficial unit). Hence $k = 1$ and therefore

$$A = ab.$$

17. From this well known theorem, the various properties of rectangular areas flow with the utmost facility. The first ten of Euclid's second book are reduced to the results of algebraic multiplication and division, remembering that area of square on a equals $a \times a = a^2$.

Recurring to equations γ in (12), if a perpendicular be dropped on a from A , the segment between it and B is $c \cos B$; call it s ,

$$\therefore b^2 = a^2 + c^2 \pm 2as$$

the double sign depending on the species of B . If it be obtuse $2as$ is additive (II. 12); if acute, $2as$ is subtractive (II. 13); if it be right $s = 0$ or $b^2 = a^2 + c^2$, (I. 47). Similarly if $b^2 = a^2 + c^2$,

$$\cos B = 0 \text{ and } \therefore B = \frac{1}{2} \pi \text{ (I. 48.)}$$

18. A triangle is easily shewn to be half a rectangle on the same base, and with the same altitude, hence a triangle $= \frac{1}{2}$ altitude \times base. The following consequences immediately result. Triangles or parallelograms on equal bases vary as their altitudes and vice versa (Young VI. 12). Triangles and parallelograms having equal bases and equal altitudes are equal, and the contrary (I. 35, 36, 37, 38, 39, 40). If a be the base of a triangle Δ , the altitude or perp. from $A = c \sin B$

$$\therefore \Delta = \frac{1}{2} ac \sin B.$$

$$\therefore \Delta : \Delta' = ac \sin B : a'c' \sin B'$$

If then the triangles (Δ, Δ') are equal and an angle in each (B, B') equal, $ac = a'c'$ or the sides are reciprocally proportional (VI. 15).

If $ac = a'c'$ and $B = B'$; $\Delta = \Delta'$ (VI. 15). If again equal triangles have each a pair of sides reciprocally proportional, or $\Delta = \Delta'$ and $ac = a'c'$; then $\sin B = \sin B'$, or the angles contained by those sides are equal or *supplementary*. Also if B only $= B'$; $\Delta : \Delta' = ac : a'c'$. This extended to parallelograms is (VI. 23), as (III. 15) may be extended into (VI. 14).

Again, since two rectangles are as their products $ab : a'b'$, the truth of (VI. 16 and 17) is evident.

19. Considering the area P of a polygon in the light of a function of sides and angles, we have

$$P = \phi \left\{ a, b, c \dots\dots\dots A, B, C, \dots\dots \right\} \text{ or in a numerical form}$$

$$\frac{P}{a^2} = \phi \left\{ \frac{b}{a}, \frac{c}{a}, \dots\dots A, B, C, \dots\dots \right\}, a \text{ being taken as linear and } a^2$$

as superficial unit. Hence in all similar polygons $P : P' = a^2 : a'^2$. (VI. 19, 20.) If further $P'' : P''' = a''^2 : a'''^2$ and it be given $a : a' = a'' : a'''$ then *ex æquali*

$$P : P' = P'' : P''' \quad (\text{VI. 22.})$$

Likewise if $P : P' : P'' = a^2 : a'^2 : a''^2$ and $a^2 = a'^2 + a''^2$; then

$$P = P' + P'' \dots (\text{VI. 31.})$$

20. As we have treated areas, we might treat volumes. The right solid being of three dimensions $V = \phi(a, b, c)$. Increasing a p -fold, b q -fold and c r -fold V is increased pqr -fold and $\phi(a, b, c)$ is shewn to be $kabc$. The solid unit then assumed is the cube on the linear unit, and $V = abc = \textit{altitude} \times \textit{base}$. Hence the right prism is also *altitude* \times *triangular base*. The oblique parallelopiped is also *altitude* \times *base*. By these principles we see at once the truth of (XI. 25, 28, 29, 30, 31, 32, 33, D, 34, 40.)

21. The examination of the circle is divided into the consideration of angles, of chords, secants, and tangents (which have one general analytical character,) and of areas as connected with the circle.

Laying down the angle at the centre double of that at the circumference on the same arc, as in Euclid, it will apply even if the former be π or a reverse angle, (III. 20). One consequence is—all angles at the circumference on the same arc are equal, (III. 21). Another, that they will be $\frac{1}{2}(\pi - x)$, $\frac{1}{2}\pi$, or $\frac{1}{2}(\pi + x)$ as the angle at the centre is less, =, or greater than π ; (III. 31). Lastly, if an angle at centre

= x , the reverse is $2\pi - x$; hence their halves or the angles at the circumference on opposite sides of the same chord are $\frac{1}{2}x$ and $\pi - \frac{1}{2}x$, their sum is therefore π (III. 22.)

If the angle θ at the circumference stand on the chord c , the radius being r , the angle at the centre is 2θ and (by γ in art. 12) it is seen $c = 2r \sin \theta$. I assume the formulæ of trigonometry here, as they are all deducible independently by help of γ . Hence if c and r be constant, θ is constant; or if r and θ be constant, c is constant, (III. 26, 27, 28, 29), Also c is a maximum with $\sin \theta$, *i. e.* when $\theta = \frac{1}{2}\pi$ (III. 15).

22. Now as to lines intersecting a circle. Let P be a point whose distance from the centre is d , and ρ a secant through it inclined to d at an angle θ . Then ρ , d and r (the radius) form a triangle, the two former including θ ; hence

$$\begin{aligned} r^2 &= \rho^2 + d^2 - 2\rho d \cos \theta \\ \text{or } \rho^2 - 2\rho d \cos \theta &= r^2 - d^2. \end{aligned}$$

The quadratic form shews that there are two roots only. Hence the line cuts the circle in two points at most. The solution of the quadratic is

$$\rho = d \cos \theta \pm \sqrt{r^2 - d^2 (\sin \theta)^2}$$

If the point be within the circle, $r > d$; and the roots are both always possible since $\sin \theta < 1$. If $\theta = \frac{1}{2}\pi$, the two values of ρ become equal; which with its converse is (III. 3). The increase of θ , diminishing $d \cos \theta$ and increasing $d \sin \theta$, will diminish ρ ; the maximum of ρ being when $\theta = 0$ and the minimum when $\theta = \pi$ (III. 7). If θ be measured negatively and the secant called R, we shall have,

$$\begin{aligned} R &= d \cos (-\theta) \pm \sqrt{r^2 - d^2 (\sin -\theta)^2} \\ &= d \cos \theta \pm \sqrt{r^2 - d^2 (\sin \theta)^2} \end{aligned}$$

which shews an equal secant on the opposite side of the diameter, (III. 7).

The same is true if the point be beyond the circle, but as d is then $> r$, the line ρ will only cut the circle while $d \sin \theta$ is less than r , (III. 8). When $d \sin \theta = r$, $\rho = d \cos \theta$; since there is only one value the line ρ is a tangent and for that value $r^2 + (\tan)^2 = d^2$ or the tangent is perpendicular to the radius through the point of contact, (III. 17, 18, 19).

23. By the theory of equations, if s and s' be the segments of ρ between the point P and the circumference, $ss' = d^2 - r^2$. Hence

when d is constant, or for secants through the same point, the rectangle of the segments is a constant quantity, (III. 35, 36). If the point be without the circle, d is greater than r and $d^2 - r^2$ is \tan^2 , therefore $ss' = \tan^2$ (36, 37.)

24. If two radii be drawn including a given angle θ at the centre, they determine a certain arc of the circle in length, as well as the sector corresponding to that arc. Denote the former by l , the latter by S ; then (θ standing for the ratio of the angle θ to the right angle)

$$\frac{l}{r} = \phi(\theta) \text{ and } \frac{S}{r^2} = \psi(\theta)$$

Take p arcs equal to l , we have p angles equal to θ and p sectors equal to s ;

$$\therefore \phi(p\theta) = \frac{pl}{r} = p \cdot \phi(\theta) \text{ and } \psi(p\theta) = \frac{pS}{r^2} = p \cdot \psi(\theta)$$

The solutions of these equations are $\phi(\theta) = m\theta$ and $\psi(\theta) = n\theta$: m and n being certain constants,

$$\therefore l = mr\theta \text{ and } S = nr^2\theta$$

Hence if r remains the same, l and S are proportional to θ , (VI. 33).

25. We cannot determine m and n without the aid of limits, because they involve the comparison of curvilinear length with rectilinear length. If we bisect the arc continually and join the points of bisection, we shall have a series of polygons of chords whose perimeters approximate to the arc without limit, while the areas between them and the radii approximate at the same rate to the sector. Denoting the ratio of the chord of θ to radius by c ; that of the chord of $\frac{1}{2}\theta$ by $c[\frac{1}{2}]$; that of chord of $\frac{1}{4}\theta$ by $c[\frac{1}{2}]^2$, and so on we have for the perimeters of the successive polygons,

$$cr; 2c[\frac{1}{2}].r; 2^2c[\frac{1}{2}]^2.r \dots \dots 2^n c[\frac{1}{2}]^n.r$$

And their areas successively

$$\frac{r}{2}.cr; \frac{r}{2}.2c[\frac{1}{2}].r \dots \dots \frac{r}{2}.2^n c[\frac{1}{2}]^n.r$$

At the limit, therefore, the sector = $\frac{r}{2} \times$ arc, and consequently the

area of the circle = $\frac{r}{2} \times$ circumference.

Also we calculate the chord of half an arc from that of the whole by

$$c[\frac{1}{2}] = \sqrt{\left\{ 2 - \sqrt{4 - c^2} \right\}}$$

Commence with the angle 60° or $\theta = \frac{2}{3}$ when $c = 1$, and calculate successively $c [\frac{1}{2}]$, $c [\frac{1}{3}]$, 2 &c.; and we shall find the series of perimeters given above approach the limit $1.0471975511 \dots \times r$, which is consequently the length of the arc of 60° ; call it $\frac{\pi}{3} r$, then $\pi = 3.14159\dots$ and the circumference of the circle is $2 \pi r$, and its area is πr^2 ; proving circles to be as the squares of their radii, (XII.²).

Now recurring to the general formula for arc and sector; if $\theta = 4$, the arc becomes $2 \pi r$ and the sector πr^2 ; hence $m = \frac{\pi}{2}$ and $n = \frac{\pi}{4}$; consequently $l = \frac{\pi r \theta}{2}$ and $S = \frac{\pi r^2 \theta}{4}$

26. In conclusion, by freely applying the principle of limits, the pyramid is treated as the limiting value of a series of inscribed prisms,

$$\frac{Bh}{n^3} \cdot n^2, \frac{Bh}{n^3} \cdot (n-1)^2, \frac{Bh}{n^3} (n-2)^2, \dots, \frac{Bh}{n^3} \cdot 2^2, \frac{Bh}{n^3} \cdot 1^2$$

where B is the base of the pyramid, and h its altitude, and n the number of inscribed prisms; the sum of the series is

$$\frac{Bh}{n^3} \cdot \frac{(n+1)n(2n-1)}{2 \cdot 3} = \frac{Bh}{6} \left(1 + \frac{1}{n}\right) \left(2 - \frac{1}{n}\right)$$

At the limit n is infinite, and the series completes the pyramid. Therefore

$$\text{Pyramid} = \frac{1}{3} \text{ base} \times \text{altitude.}$$

This involves (XII. 3, 4, 5, 6, 7, 8, 9). The case of similar pyramids, (XII. 8,) is done by transformations into similar parallelepipeds.

Cylinders are the limits of polygonal prisms inscribed in them; and cones, those of the inscribed pyramids. Their properties are therefore the same as those of prisms and pyramids, their circular bases permitting a definite reference to the homologous lines, the radii. (XII. 10, 11, 12, 13, 14, 15.)

Lastly, the sphere is determined solely by its radius. Hence the volume of the sphere bears a determinate ratio to the cube of its radius.

27. Modern authors of the highest repute have concurred in deducing the theory of Trigonometry from the definitions of sin and cos, which I have adopted at the commencement of this paper, introducing the functions tan, sec, &c. as convenient abbreviations, but without any reference to their geometric meaning. (See Peacock's Report on Analysis. Brit. Assoc. 1833, page 291.)

The application of a few abstract principles to geometrical ideas of the simplest character enables us thus to develop the whole mass of complicated properties founded on them, in a comprehensive and concinnous mode; justifying by the result the daring paradox of D'Alembert, that the more abstractedly an investigation is carried on, the more lucid and satisfactory does it become. It must not, however, be for a moment forgotten that analysis is but the lever; the fulcrum of its support lies in the ideas peculiar to the subject to which it is applied. Without a vivid and distinct conception of them our labour is idle. Professor Whewell in his tractates has done mathematical education signal service by insisting on this point, and his own works on Mechanics, with those of Professor De Morgan on Algebra and the Differential Calculus, may be hailed as some of the most valuable gifts which the thoughtful student has received from the hands of the masters of science.

Description of a new genus of Falconidæ. By B. H. HODGSON, ESQ.

In the Journal of the Society for April, 1836, p. 227, I described a species of Eagle as *Aquila pernigra*, but without noticing its singular peculiarities of form, as especially the unique foot, of which the outermost fore digit is even smaller, in proportion to the innermost, than in the human hand. There is no such foot heretofore described in the whole family. The rest of its structure, as the feeble legs and vast floating wings, agrees with *Milvus*; and, in sooth, our genus *Heteropus* should stand *inter Aquilinarum et Milvinarum stirpes*, and be thus characterized:—Bill and head small and undepressed, *aquilomilvine*. Figure slender, with very ample wings and tail, the former rather exceeding the latter; their gradation aquiline, having the greatest quills incurved. Tarsi short and plumed. Toes nervous, unequal, the inner and hind highly developed, the inner being nearly as long as the central and stouter, the outer being much the shortest and feeblest: talons very acute, and unequal, but not highly curved. Type, *Aquila pernigra*, Nobis, *loc. cit.*

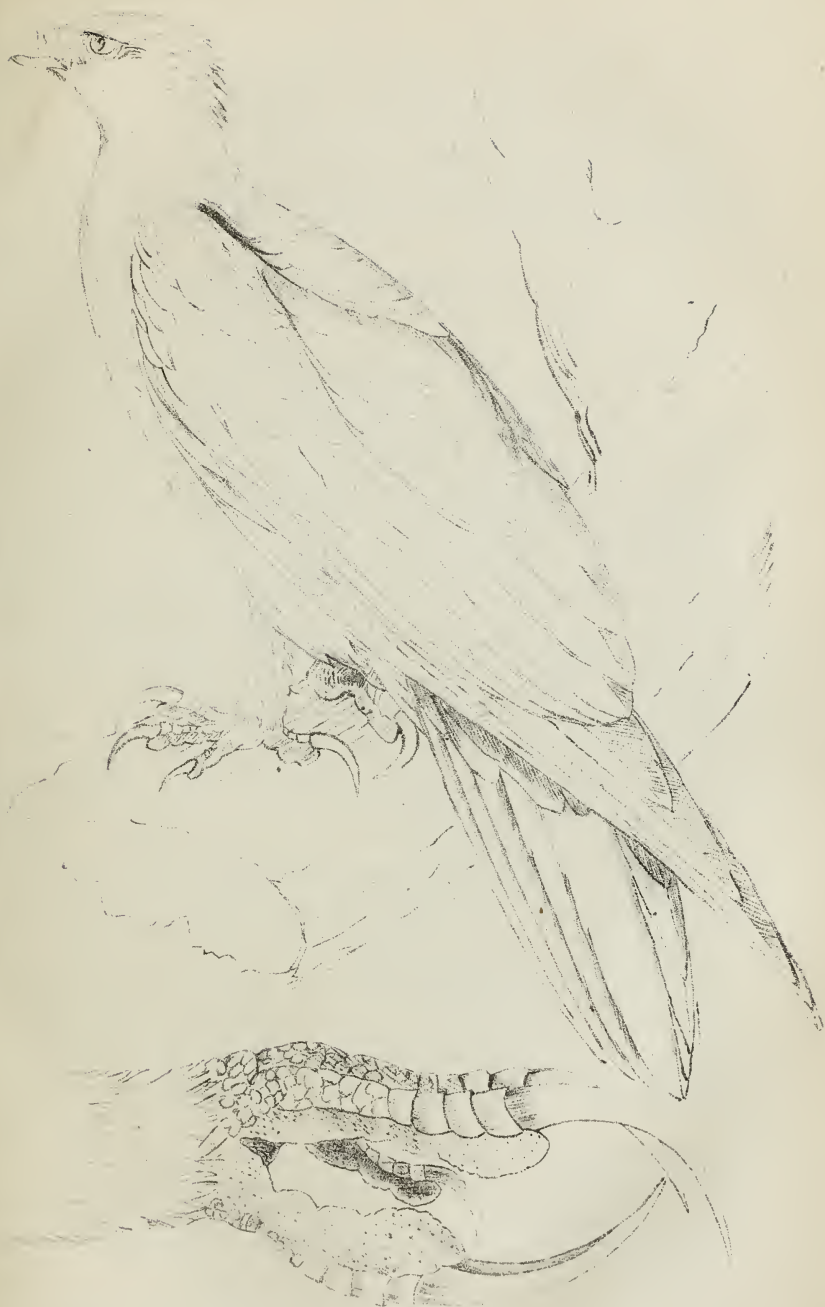
[N. B.—In Mr. Jerdon's Catalogue of the Birds of Peninsular India (*Madr. Jl.* No. XXIV, 68,) that naturalist remarks, that—"On the summit of the Neilgherries there is frequently seen a black Eagle, larger than the *Wokhab* (*Aquila Vindhiana*, Franklin), but of which I was unable to procure a specimen. I have heard it is also

often met with in Coorg.”—And in the privately circulated *Supplement* to this catalogue, Mr. Jerdon describes the female, and mentions having examined three specimens of this “curious Eagle,” which he there classes as *Nisæetus ovivorus*, but with a double mark of doubt as to the genus; and he has since transmitted specimens of both sexes to the Society’s Museum by the title of *Ictinæetus ovivorus*, but subsequently to the arrival of the foregoing paper by Mr. Hodgson, with whose former description of the species Mr. Jerdon’s specimens accord in every particular. Moreover, with reference to the specific name bestowed by Mr. Jerdon, Mr. Hodgson had already stated that—“This is a shy bird, which adheres exclusively to the wild and mountainous tracts of the hills. Its body is entirely free from offensive odour and vermin, and its prey chiefly the Pheasants of the region it frequents, *as well as their eggs.*”

Mr. Jerdon, on the other hand, did not fail to notice the peculiar structure of the feet, and I quote the following from his very interesting description: “This remarkable Eagle I have placed for the present, though with doubt, under the genus *Nisæetus*. It differs from it in superior length of wing and tail—its shorter tarsus, shorter toes, and more especially in their comparative size—the outer toe and claw being remarkably small, and the inner claw of very great size. The extreme shortness of the outer toe is, as far as I can recollect, peculiar to it among the diurnal *Raptores* of this country, though common among the Owls. Its habits, too, are, so far as I know, peculiar, and differ from those of the other Indian Eagles. * * * It hunts about the edges of the hills more generally than on the higher parts of the table-land, and most frequently over bushy ground, though I have also seen it over forest, both on the top of the hills and half way down the Coonor ghaut. It sails slowly along with very little motion of the wings, usually very close to the ground, hunting tolerably regularly, not unlike the Harriers, and like them hardly ever alights except for the purpose of feeding.

“In the three specimens I have examined, I found that eggs and nestlings had formed its only food. Among these I recognized the eggs of the Hill Quail (*Coturnix erythrorhyncha*), of the *Malacocercus Somervillei*, and of some Doves (*Turtur tigrina* and *T. Cambayensis*), beside others I did not know, and several nestlings. I have seen it, since I procured my specimens, alight for a few seconds on a large bush over which it had been circling for some time, and apparently devour something. I found in this bush a Dove’s nest empty, which had evidently been robbed. This Eagle thus appears to be habitually a robber of bird’s nests; and as Doves, as well as some other birds, breed throughout the whole year, it can probably sustain itself mostly on its favorite food, though it doubtless occasionally destroys young, feeble, or sickly birds, and perhaps reptiles.”

The *Limnaëtus unicolor* is likewise a plunderer of nests, though I cannot say of the eggs contained in them. A fine specimen, presented by Mr. Frith to the Society, and shot in Mymensing, first attracted that gentleman’s attention by the alarm which was manifested upon its approach to a large banyan tree, upon which were several of the deep and massive nests of the *Sturnus contra*, one of which it immediately proceeded to pull to pieces, to rob of its contents, in which operation it was shot. It is not, therefore, improbable that the same habit will prove to be more or less prevalent among various true Eagles, *Spizaëti* (*Nisæetus*, Hodgson), and Buzzards. The specimen adverted to agrees perfectly with the description of *Spizaëtus hastatus*, Lesson, in the ‘*Zoologie du voyage de M. Belanger*,’ and I believe it also to be the *Falco limnaëtus*, Horsfield, v. *F. unicolor*, Temminck, constituting the *Limnaëtus unicolor*, Vigors. *Cur. As. Soc.*—E. B.



Cymindinæ. Heteropus mihi. H. Pernigra mihi.

2 Inside of Foot size of nature

*Proceedings of the Asiatic Society.**(Friday Evening, 10th February 1843.)*

The monthly meeting of the Society was held on Friday evening, the 10th instant, the Honorable the President in the Chair.

The following gentlemen proposed at the last meeting, were balloted for and duly elected :—

The Rev. CHAS. IRVINE, of St. Xavier's College.

Lieut. BAIRD SMITH, B. E.

BABOO COSSINATH BHOSE.

JOSEPH ST. POURCAIN, Esq. Chandernagore.

The usual communication was ordered to be made to them.

The following Members were proposed: Professor Mohl, Secretary of the Asiatic Society of Paris, proposed as an Honorary Member by H. Torrens, Esq. and seconded by R. Houston, Esq. It was referred, as in like cases, to the Committee of Papers, to report on the propriety of conferring this distinction.

Dr. TRANTER, Malwa Contingent, proposed by the Honorable the President, seconded by Mr. Masters.

The Acting Secretary reported to the meeting that he had enquired as to the state of the account of the transcription of the Veds,* as requested by Major Troyer's letter, and that it appeared by reference to the Journal, vol. VIII. page 531, that the transaction was then taken over from Mr. James Prinsep's executor, and that a balance was due to the Society of rupees 233 : 7 : 15, from the French Government, which would now be claimed. Instructions had been sent to Benares to Judoonath Pundit, who formerly conducted the transcription, requesting him to continue it.

It farther appeared, as to the copies of the 4th Vol. of the Mahabarata, that a box containing 56 copies of it, with 56 copies of the Index, had been sent from the rooms in April 1840, and by an Office Memorandum, that the case had been shipped on the 9th September 1840, by Government on the ship *Larkins*, with a letter from Mr. Torrens; but no acknowledgment of the arrival of the case had been received from Europe. The Acting Secretary stated, that he had written full particulars of the above to Major Troyer.

The Acting Secretary stated, that under the orders of the President, a box containing the following works, in all 13 volumes, had been sent to His Highness the Pacha of Egypt from the Society by Dr. Wise, who had sailed on the *India* this morning. No letter could accompany the donation, be-

* Proceedings for January, 1843.

cause it was not possible to procure the proper kind of paper on which to write it during the Mohurram.

Books delivered to DR. WISE, for the Pasha of Egypt, on the 8th February, 1843.

Fatawa Alemgéri, Vols. 1 to 6.

Inaya, Vols. 2d, 3d, and 4th.

Jawami ul Ilm ul Riazí, one copy.

Anis ul Musharrahin, one ditto.

Sharaya ool Islam, one ditto.

Khazanat ul Ilm, one ditto.

The Acting Secretary then read the following Minute, relative to the state of part of the premises.

Minute.

We, the undersigned, having, at the request of the Hon'ble the President and the Acting Secretary, examined the screen wall on the North side of the Society's House, are of opinion, that it is not in a dangerous state; that the cracks are only due to slight sinkings of other parts of the building very common in Calcutta; and that it is well supported by the manner in which the new building and its roof have been carried up and laid on. We therefore recommend, that the arch of the Eastern door only, be renewed, as being all that is at present required.

W. N. FORBES, *Lieut.-Col.*

A. IRVINE, *Major.*

Calcutta, Jan. 2, 1843.

He further represented the utility of a Skylight over the Stair-case, which was ordered to be referred to the Committee of Papers.

The following Books were presented and purchased:—

List of Books received for the Meeting, on the 10th February, 1843.

The Calcutta Literary Gleaner, February 1843, Vol. 1., No. 12. Presented by the Editors.

The Calcutta Christian Observer, New Series, February 1843, Vol. iv., No. 28. Presented by the Editor.

The Oriental Christian Spectator, 2nd Series, Bombay, 1842, Vol. iii. No. 12. Presented by the Editor.

Specimens of the Popular Poetry of Persia, translated by A. Chodzko, London, 1842, 8vo. Purchased.

J. J. Bayer's, Gemmarum affabre sculptarum thesaurus, 1720, fol. Presented by H. Torrens, Esq.

Gazophilacium Linguæ Persarum, Authore P. Angelo a S. Joseph. Amstelodami, 1684, fol. Presented by H. Torrens, Esq.

Piddington's Tabular View of the Generic Characters of Roxburgh's Flora Indica. Presented by the Author.

Piddington's English Index to the Plants of India. Calcutta, 1832, 8vo. Presented by the Author.

Actes de L'Academie Royale des Sciences, Belles-Lettres et Arts de Bordeaux, 1840, 2eme, Anneé, 1er. á 4e. trimestres, 1841, 3eme. Anneé, 1er. á 4e. trimestre et.

1842, 4eme. Anneé, 1er. trimestre. Presented by the Academie Royale de Bordeaux.

Meteorological Register for December, 1842, from the Surveyor General's Office.

A Chinese Wood Engraving and Description of the Porcelain Tower of Nankin. Presented by J. H. Stocqueler, Esq.

Read the following letter, received through the Private Secretary to the Right Honourable the Governor General :—

To the Secretary of the Asiatic Society of Bengal, Calcutta.

Washington, 1st June, 1842.

DEAR SIR,—I have the honor to transmit to you copies of the constitution, and list of Members, of the National Institution for the promotion of Science lately established in this city, together with the first and second Bulletins of its Proceedings, and to request you to lay them before your Society, that its Members may become acquainted with the existence and objects of the National Institution, with a view to future correspondence.

I have the honor to be with great respect,

Approved.

Your most obedt. Servant,

J. R. POINSETT,

FRANCIS MARKOE, JUN.

President National Institution.

Corresponding Secretary.

To the Secretary of the Asiatic Society of Bengal, Calcutta.

Office of American and Foreign Agency,

New York, June 9, 1842.

SIR,—With reference to my respects of the 6th April ultimo, informing you of the enrolment of your Society among the Correspondents of the National Institution, upon my proposal, I have now the honor to transmit you the annexed letter of the Corresponding Secretary thereof of the 1st instant, and am, with great respect, Sir,

Your most obedt. Servant,

AARON H. PALMER,

Corresponding Member of the National Institution.

Ordered.—That upon receipt of the papers referred to, the whole be duly acknowledged, with expression of the Society's desire to co-operate with the National Institution of Washington.

Read the following letter received through Mr. Gladstone of Messrs. Gillanders and Co. :—

MONSIEUR,

Bordeaux, le 30 Juillet 1842.

L'Academie Royale de Bordeaux a reçu en 1839, de la Societe Asiatique de Calcutta, 24 cahiers comprenant le recueil de les travaux pendant les anneés 1836-1837; en meme temps elle reçut 4 volumes publiés par la meme Société sur la recherche des Antiquités, des Arts, des Sciences, et de la Litterature de l'Asie.

Elle a cherché plusieurs fois l'occcsion de vous adresser l'expression de sa gratitude pour un don aussi précieux et aussi de vous faire parvenir le recueil des actes qu'elle publie régulièrement depuis plusieurs anneés; comme elle n'a rien reçu de la Société Asiatique depuis 1839, elle a lieu de craindre que ses envois n'aient pas été fidèlement remis.

En consequence elle a accepté les offres bienveillantes de Mr. Gautier un des ses membres, qui dirige un navire sur Calcutta, pour vous adresser ses remerciemens vous faire don de ses travaux, et vous prier de continuer un échange dont elle sent tous le prix : elle serait heureuse de former des relations durables et suivies avec une Société qui a rendu et rend d'important services aux Sciences, aux Lettres, et aux Arts, par ses lumieres, son zèle et ses belles publications.

J'ai l'honneur d'être, Monsieur, votre très dévoué Serviteur,

C. H. VALAT, *Secret. Gen. de l'Acad.*

A M. le Secrétaire de la Société Asiatique de Calcutta.

Ordered.—That the same, with the donation of Books be duly acknowledged.

Read letter from J. Beaufort, Esq., Seory, as follows :—

Last month the Collector of Beerbhom sold by auction a good deal of property belonging to the temple at Deoghur, amongst which was a heap of coins. Now, I cannot pretend to any knowledge of Numismatics, and I cannot tell whether the Society would value any of these coins; but as I thought it possible that some few of them might be curious, I bought some of each kind, and enclose them to you, for the benefit of the Society.

Should they prove to be of no value, I shall not care what becomes of them.

Your's truly,

J. BEAUFORT.

N. B. The following is a List of the Names under which I bought them.—The name is written inside of each paper.

The Coins, 68 in number, were found to be as follows :—

Benares Rupee,	....	....	...	....	1 Piece.
Patna, ....	....	....	....	....	1
Nepal, ....	....	....	....	....	1
Benares 2 Annas,	....	....	....	....	5
Jhansee, ....	....	....	....	....	1
Arcot, ..	....	....	....	....	4
Assam, ....	....	....	....	....	4
Nagpore, ...	....	....	....	....	4
Lucknow,	....	....	....	...	4
Nepal, ....	....	....	....	....	2
Unknown, ..	....	....	....	....	4
Assam Anna,	....	....	....	....	12
Arcot, ....	....	....	....	....	1
Nepal, ....	....	....	....	....	8
Unknown, ..	....	....	....	....	8
Assam Half Anna,	....	....	....	....	8

Seory, January 16, 1842.

Total, 68

Read extract of letter from D. F. McLeod, Esq. C. S. as follows :—

“ I have long by the way purposed intimating to you this as a remarkable philological fact. It was clearly ascertained by a German Missionary, named Mr. Loesch, who

was recently settled in this district, but sad to say, carried off with his companions by Cholera; that the language spoken by our Gonds is fundamentally the same with the Canarese. Mr. L. had become familiar with the latter formerly at Mangalore and other places under the Bombay Presidency; and found himself able almost to converse with the Gonds, or at all events to make himself in a great measure understood by them by using this language; and being a gentleman of great acquirements and philological acuteness, had he lived, I have no doubt he would have been able to throw much light on the interesting question of the origin of this people. It has been decreed otherwise, but were the fact generally known, Canarese scholars might be induced to turn their attention to the subject.

Read a note from Dr. Campbell of Darjeeling, on the "Bora Chung," or Burrowing Fish, which was referred to the Editor of the Journal for publication. Also a paper from Lieut. Shortrede, of the Trigonometrical Survey, on Meteors observed by him on the night of the 13th August, 1842. Referred to the Journal for early publication.

The thanks of the Society were ordered to be expressed to the various donors and contributors of all the foregoing.

Reports of the Librarian were read as follows:—

H. PIDDINGTON, Esq.

Acting Secretary Asiatic Society.

SIR,—My report of this month refers to the collection of Roman, Greek, Indo-Grecian and Indo-Scythian coins in the cabinet of the Society, which have been arranged, numbered, and labeled, and I have now the pleasure of submitting to you three lists, exhibiting an arrangement, and a detailed description of the coins.

The Roman coins amount to 297, all of Roman Emperors, from Augustus down to the destruction of the Occidental empire. With the exception of a few, they are not remarkable for their rarity. Mr. J. Prinsep, in his description of the Roman coins in the possession of the Society, observes (*As. Jour.* Vol. I. p. 391,) that most of them were found in India, which would certainly give them some interest; but those coins being no where specified, it is now impossible to identify them. A few of these coins are of silver, and none of gold; the only gold coin and some silver ones, formerly in the cabinet, being lost. But a comparison of the present list with that of the late Mr. J. Prinsep will shew, that the cabinet has not been greatly diminished. I here place the lists in juxtaposition.

	<i>Coins at present in the cabinet.</i>	<i>Coins in the cabinet according to the statement of Mr. J. Prinsep.</i>
Silver coin of Augustus	..... 1	..... 4
Copper coins ditto ditto	..... 2	..... 4
Copper coins of Tiberius	..... 1	..... 0
Ditto ditto of Claudius	..... 4	..... 0

	<i>Coins at present in the cabinet.</i>	<i>Coins in the cabinet according to the statement of Mr. J. Prinsep.</i>
Silver coins of Nero	..... 1	..... 2
Copper coin of Galba	..... 1	..... 1
Silver coin of Vespasian	..... 0	..... 1
Copper coins of ditto	..... 6	..... 6
Copper coins of Titus	..... 2	..... 1
Ditto ditto of Domitian	..... 1	..... 0
Ditto ditto of Nerva	..... 0	..... 2
Ditto ditto of Trajan	..... 8	..... 5
Ditto ditto of Hadrian	..... 9	..... 8
Ditto ditto of Lucilla	..... 5	..... 1
Ditto ditto of Antonin	..... 11	..... 45
Ditto ditto of M. Aurel.	..... 15	..... 0
Ditto ditto of Faustina	..... 3	..... 4
Ditto ditto of Verus	..... 1	..... 0
Ditto ditto of Commodus	..... 23	..... 16
Ditto ditto of Septimius Geta	..... 0	..... 1
Ditto ditto of Julia	..... 1	..... 1
Ditto ditto of Severus	..... 8	..... 6
Ditto ditto of Maximinus	..... 0	..... 2
Ditto ditto of Mammaea	..... 1	..... 2
Ditto ditto of Gordianus	..... 5	..... 2
Ditto ditto of Philippus	..... 8	..... 8
Ditto ditto of Severa	..... 1	..... 0
Ditto ditto of Decius	..... 5	..... 6
Ditto ditto of Valerianus	..... 2	..... 0
Ditto ditto of Gallienus	..... 9	..... 9
Ditto ditto of Victorin	..... 8	..... 1
Ditto ditto of Tetricus	..... 3	..... 1
Ditto ditto of Aurelianus	..... 2	..... 3
Ditto ditto of Probus	..... 9	..... 9
Ditto ditto of Carus	..... 4	..... 0
Ditto ditto of Numerianus	..... 0	..... 1
Ditto ditto of Diocletian	..... 30	..... 41
Ditto ditto of Maximian	..... 30	..... 30
Ditto ditto of Constantin	..... 47	..... 28
Ditto ditto of Maxentius	..... 1	..... 1
Ditto ditto of Valens	..... 0	..... 3
Ditto ditto of Crispus	..... 1	..... 0
Ditto ditto of Licinius	..... 1	..... 0
Ditto ditto of Decentius	..... 1	..... 0
Ditto ditto of Constantin M.	..... 2	..... 2

	<i>Coins at present in the cabinet.</i>	<i>Coins in the cabinet according to the statement of Mr. J. Prinsep.</i>
Ditto ditto of Constantius	..... 14	..... 12
Ditto ditto of Theodosius	..... 3	..... 2
Gold Coin of Arcadius	..... 0	..... 1
Copper Coin of Honorius	..... 0	..... 1
Ditto ditto of Justinianus	..... 1	..... 1
Ditto ditto of Justinus	..... 1	..... 1
Ditto ditto of Mauricius	..... 1	..... 1
Ditto ditto of Zimias	..... 1	..... 1

It would be undoubtedly desirable to have a complete series of Roman coins, but as such collection is not directly connected with the purposes of the Society, and as there are other objects the attainment of which is of much higher importance, it is perhaps not advisable to encourage an increase of these coins for the present.

On the other hand, it cannot be urged too much on the attention of the Society to enlarge the collection of the Indo-Grecian, Indo-Scythian and Hindoo coins, in which the cabinet is very deficient, their number amounting only to 116 specimens, most of which are moreover duplicates, and their legends, types, etc. generally effaced. General opinion seems to transfer to the Asiatic Society as an hereditary obligation, researches respecting the Antiquities and History of Afghanistan, which can be instituted with propriety only by means of a large collection of coins.

To form this devolves the more on the Society, as there are few Societies placed in a more favourable position for collecting those coins, than the Asiatic Society of Bengal.

I would also beg to draw the attention of the Society to a branch of coins which has been investigated in part only. I allude to the coins of the ancient Hindoo Kings, allied by their coins to the Greeks- and their successors, and I need not say, how valuable such a collection may prove to supply the large blank of historical account from Azoka to the Mahomedan conquest.

Of Grecian coins the cabinet contains no more than sixteen, and I beg to observe, that additions, especially to those of the successors of Alexander, are also desirable, as many of their types are closely allied to the Indo-Grecian coins, and show in typical representation the influence which Grecian art and genius had on the development of Indian civilisation.

I take this opportunity of forwarding to you the list of books received into the Library during the past year, the number of which amounts to 260, an account of the Oriental publications from May 1838 to the 31st December 1842, and an abstract of the Oriental publications which have been sold from the 1st January to the 27th December 1842.

I have the honor to be, Sir,

Your obdt. Servant,

E. ROER,

Librarian Asiatic Society.

13th January, 1843.

CATALOGUE OF THE COINS IN THE CABINET OF THE ASIATIC SOCIETY.

A Catalogue of the Coins of Roman Emperors in the Cabinet of the Asiatic Society.

Augustus.

a. Silver.

1 Obv. Cæsar Augustus...atriæ. Head of the emperor, well executed.—Rev...Caesares. Two figures, standing and supporting two shields, the one part covering the other. This coin is partly cut off, and undoubtedly the same with that, mentioned by Mediobarbus, page 39, where the complete inscription is C. et L. Caesares Augusti F. Cos. Desig. Princ. Juvent.

b. Copper.

2 Obv. Caes. Aug. Head of the Emperor (much effaced.)—Rev. Gloria. S. C. Type, Victory, in her right a wreath, in the left perhaps a tuba.

3 Obv. Divus Augustus S. C. Head of the Emperor. Rev. Diva Augusta. Type. A figure seated on a state-chair, holding in the right an ear, and in the left apparently a torch. B. C. 14. V. Mediobarbi Num. Imp. Rom. p. 44.

Tiberius Claudius Nero (A. D. 13—37.)

Copper.

4 Obv. Head of the emperor (much effaced.)—Rev. Γ Υ. A military figure, in the left a spear.—Donor H. Torrens, Esq.

Tiberius Claudius (A. D. 41—54.)

Copper.

5 Obv. Imp. Claudius. Head of the emperor with radiated crown.—Rev. Apollini fons. Type. Apollo standing, in the right a palm branch, with the left placing something on an altar.

6 Obv. The same legend and type.—Rev. Aequitas Aug. The figure of Equity standing.

7 Obv. The same legend and type.—Rev. Felicitas Aug. A figure standing, in the left a cornucopiæ.

8 Obv. (Clau?) dius Aug. Head of the Emperor with radiated crown.—Rev. Foa. P. Jupiter standing holding thunderbolt and spear, found at Patna.—Donor — Rose, Esq.

L. Domitius Nero. (A. D. 54—68.)

1. ROMAN COINS.

Copper.

9 Obv. Legend illegible. Head of the emperor.—Rev. Securitas. A figure seated, in the left a spear, and approaching the head with the right (A D. 54) Med. p. 90. Found at Patna.—Donor — Rose, Esq.

10 Obv. Nero Claudius Caes. Au : Head of the emperor with a wreath of laurels.—Rev. (R) om (a) Type not much discernible, probably Roma, seated on trophies.

2. EGYPTIAN COINS.

Silver.

11 Obv. ... ερω ... Κλαυ Κα ... Head of the Emperor with radiated crown.—Rev. Αυτοκρατ An eagle, a palm-branch in its right.

12 Obv. αυ. ... The same as the preceding.

Servius Sulpicius Galba (A. D. 68—69.)

ROMAN COINS.

Copper.

13 Obv. Galba Imp. Caes.....Head of the emperor. Rev. Legend and type indiscernible.

*Flavius Vespasianus (A. D. (69—79.)**Copper.*

14 Obv. (Imp.) Caes. Vesp. Aug. P. M. T. R. (...Cos) III. Head of the Emperor, wreathed with laurels—Rev. Leg. Ceres August. S. C. Ceres standing, holding ears, and a cornucopiæ, A. D. 71.

15 Obv. (I) m (p) Caes Vesp. Aug. P. M. T. R. P. (III). Head of the Emperor, facing to the left.—Rev. P. (a x) August. S. C. A figure standing, in the left a caduceus. A. D 71. V. Med. p. 113.

16 Obv. Imp. Caes. Vespasian, Cos. VIII. Head of the Emperor.—Rev. Ceres August. S. C. Ceres standing, in the right holding ears, in the left a spear, A. D. 77. V. Med. p. 115.

17 Obv. Imp. Caes. Vespasianus Aug. Cos. VIII. (The legend is running from the right to the left) Head of the Emperor with radiated crown.—Rev. Ceres August. Type, Ceres.

18 Obv. Imp. Caes. Vespasian. Aug. Cos. VII. P. P. Head of the Emperor, wreathed with laurels.—Rev. Providentia S. C. Type. A temple, A. D. 77.

19 Obv. Divus Aug. Ves. ... ianus. Type as in 18.—Rev. (Aeq) uitas August, S. C. The type of Equity. A. D. 79. V. Med. p. 117.

20 Obv. Vespasian. Aug. Head of the Emperor (almost obliterated.)—Rev. illegible. S. C. A figure standing.

*Titus Flavius Vesp. (A. D. 79—81.)**Copper.*

21 Obv. T. Caes. Imp. Aug. Cos. VII. Censor R.—Rev. Judæa Capta. S. C. Two figures under a palm-tree, effaced. A. D. 77. V. Obv. Med. p. 123.

22 Obv. Leg. illegible. Head of the Emperor. Rev. Providentia. Type, A temple.

*T. Flavius Domitianus Vesp. (A. D. 81—96.)**Copper.*

23 Obv. Imp. Caes. Domitian. Aug. Germ. Cos. XI. Head of the Emperor, crowned with laurels. Rev. Germania Ca | p | ta. | S. C. A trophy, on the left a figure (the Emperor) with a shield, kicking another, seated near the trophy. A. D. 85.

*Nerva Trajanus (A. D. 98—117.)**Copper.*

22 Obv. Im. aes. Nerva Trajan. Aug. ... Head of the Emperor, crowned with laurels. Rev. O. ... Tr. Pot. Cos. II. (?) S. C. A figure standing before an altar.

23 Obv. Imp. Caes. Nerva Traja. the same type. Rev. Effaced.

24 Obv. Aug. Ger. Dac. P. M. Tr. P. The same. Rev.o Ro. S. C. Type. A figure standing, and holding in the left a cornucopiæ.

25 Obv. ... vae Trajano Aug. Germ. Dac. P. M. Tr. Cos. X. P. P. The same type. Rev. (Opti mo (Principi) : A helmeted figure, seated on trophies and holding a spear in the left, and a Victory, as appears, in the right.

26 Obv. Imp. Caes. Nerva Trajan. Aug. Germ. Dacio. Head of the Emperor with radiated crown. Rev. P. R. VII. Imp. IIII. Cos. V. P. P. S. C. A figure, seated in a reclining posture, A. D. 103.

27 Obv. a Caes. Aug. P. Ma. Tr. P. Cos. III (I) Head much effaced. Rev. August. S. C. A figure standing, in the left a cornucopiæ.

28 Obv. P. M. Tr. P. Head of the Emperor with a crown of laurels. Rev. | Optim | o Principi S. C.

29 Obv. anus Aug. Cos. IIII. Bearded head of the Emperor Rev. ... or (gloria) S. C. A female, in the right a sacrificial vessel, in the left a cornucopiæ.

30 Obv. Legend illegible. Head of the Emperor with a laurel crown. Rev. Salu ... S. C. A female, holding with the left a sacrificial vessel over an altar.

P. Aelius Hadrianus (A. D. 117—138.)

Copper.

31 Obv. Hadrianus Augustus. Head of the Emperor. Rev. Feliatati Aug. Cos. III. P. P. The Pretorian ship. A. D. 129 (V. Med. page 130.)

32 Obv. The same legend. Head of the Emperor, crowned with laurels. Rev. Cos. III. A man riding on horseback.

33 Obv. Hadrianus Augustus P. P. Head of the Emperor with radiated crown. Rev. Hilaritas (P.) R. Cos. III. S. C. A figure standing and having two children at its feet. A. D. 129. vid. Med. p 180.

34 Obv. Hadrianus Aug. Cos. III. P. P. Head of the Emperor. Rev. Two figures standing and having their hands joined. Leg. Felicitas Aug. S. C., A. D. 130 vid. Med. p. 182.

35 Obv. Hadrian. Aug. Cos. Head of the Emperor, crowned with laurels. Rev. Fel. ic. a S. C. A figure standing, and holding in the left a cornucopiæ.

36 Obv. | Traj | anus Had | rianus | Head of the Emperor crowned with laurels. Rev. Legend effaced. Type. A figure standing.

37 Imp. Cæsar Traj. Hadri. Head of the Emperor with radiated crown. Rev. Pietas Augusti, S. C. A figure standing before an altar.

38 Obv. Imp. Caes. Trajanus Hadrianus. Cos. II. Bearded head of the emperor with radiated crown.

39 Obv. Imp. Trajan Hadrianus. Head of the Emperor with radiated crown and part of the bust. Rev. Cos. Concordia. A figure seated.

Lucilla, L. Aelii uxor.

Copper.

40 Obv. Lucilla Augusta. Head of Lucilla with part of the bust. Rev. L. P. | iet | as S. C. A female standing before an altar, with a small box and a sacrificial vessel. S. Med. p. 190.

41 Obv. The same legend and type. Rev. Legend illegible. A figure seated with sacrificial vessel and cornucopiæ.

42 Obv. The same legend and type. Rev. Venus S. C. Venus standing, in the right a monkey and in the left a spear. Med. p 190.—Donor H. Torrens, Esq.

T. Aelius Hadrianus Antoninus Pius. (A. D. 138—161.)

Copper.

43 Obv. Antoninus Aug. Pius Tr. P. Cos. III. Head of the Emperor with radiated crown. Rev. Salus publica S. C. A female figure, in the left a spear, the right raised over an altar.

44 Obv. Antoninus Aug. Pius P. P. Tr. P. Bearded head of the Emperor, with a crown of laurels. Rev. III. Type of Sol.

- 45 Obv. Antonius Aug. Pius. The same type. Rev. Munificentia Aug. Cos. IV. An elephant moving.
- 46 Obv. ninus Aug. Pius P. P. Type as in 44. Rev. Salus. Cos. III. Type as in 43.
- 47 Obv. Antoninus Pius Aug. Type as in 43. Rev. P. M. Tr. P. XVII. Imp. Cos. III. A figure seated on trophies, in the left a spear, in the right some thing indiscernible.
- 48 Obv. ninus Aug. Pius P. P. Type as in 43. Rev. P. T. XX. S. S. C. Jupiter standing, with thunderbolt and spear.
- 49 Obv. Antonius Aug. Pius P. P. Tr. P. (X) XII. Type as in 43. Rev. Cos. III. S. C. A figure standing, and holding a cornucopiæ in the left, and a scale in the right. A. D. 150.
- 50 Obv. Ant us P. P. Tr. P. XII. Type as in 26. Rev. rtuna o | bse | quens. Cos. III. S. C. The type of fortune. A. D. 150. Med. p 204.
- 51 Obv. Antonius Aug. Pius P. P. Tr. P. XXIII. Type as in 43. Rev. Pietati Aug. Cos. III. S. C. Type. A figure standing, holding in the right a scale, and in the left a cornucopiæ, at the feet two children, A. D. 161. Vid. Med. p 205.
- 52 Obv. Antoninus Aug. Pius R. P. Tr. P. ... The same type. Rev. ... Aug. S. C. A figure standing, holding in the right a wreath over an altar, and in the left a spear.
- 53 Obv. Antoninus Pius Aug. Head of the Emperor with a crown of laurels. Rev. — Cos. ... S. C. A naked Hercules standing, and holding in the right the club.

M. Aurelius Verus Antoninus (A. D. 161—180.)

ROMAN COINS.

Copper.

- 54 Obv. Leg. Aurelius Cæsar Aug. Pic. F. Head of M. Ant. Rev. | Tr. P. | ot III Cos. II. S. C. A female figure standing, in the right apparently holding an ear, in the left a basket. A. D. 149. V. Med. 213.
- 55 Obv. | M. An | tonius Pius Aug. Germ. Head of the Emperor crowned with laurels. Rev. Venus Victri | x. | A figure standing. A. D. 164 (?)
- 56 Obv. M. Aurel. Antoninus Aug. Armeni. ... The same type. Rev. ... XIX. Imp. I. Cos. ... A figure standing, in the right a walking stick, at its feet a globe. A. D. 165.
- 57 Obv. M. Aurel. Antoninus Aug. Arm. Parth ... The same type. Rev. Tr. Pot. XX. Imp. ... S. C. A Victory standing, in the left hand a palm, and with the right having raised on a palm-tree a shield, in which is written Vic. Part. A. D. 165. V. Med. p. 219.
- 58 Obv. M. Antoninus Aug. Arm. Pa. ... The same type. Rev. (Tr. Pot) XXI. Imp. Cos. III. S. C. A victory, holding in the right hand a branch of laurels, and in the left a palm. A. D. 167. V. Med. 220.
- 59 Obv. M. Antoninus Aug. Germ. Tr. P. XXIX. The same type. Rev. Imp. VII. Cos. III. S. C. A military figure moving, in the right the Roman eagle, in the left some trophy. A. D. 167.
- 60 Obv. Imp. Caes. M. Aur. Antonius Pius. ... The same type. Rev. XXXII. Cos. III. P. P. S. C. A figure standing, in its right a crown over a small altar.
- 61 Obv. M. A. Antoninus. Aug. Tr. P. XXXII. (?) The same type. Rev. Imp. VIII. Cos. III. S. C. Type. A Victory.
- 62 Obv. Holding a wreath with the right. rel. Antonius Aug. Pius Tr. P. XXXII. The same type. Rev. Imp. X. Cos. III. Type as in 61. P. R. S. C. A. D. 172. V. Med. p. 227.
- 63 Obv. M. Aurel. Antonius Aug. Tr. P. XXXIV. Head of the Emperor with radiated crown. Rev. Imp... Cos. P. P. S. C. Type as in 61. A. D. 180.
- 64 Obv. Divus M. Antoninus Pius. Bearded head of the Emperor, Rev. Cons | ecrati | o S. C. An eagle standing on a globe. A. D. 180. V. Med. p. 228.
- 65 Obv. M. ... toninus Aug. Type. Head of the Emperor with radiated crown. Rev. Salus Aug. Cos. ... S. C. Type. A female figure, the left hand raised over an altar.

66 Obv. Imp. Cæs. ... us Antoninus Pius Aug. Type as in 63. Rev. | Pax Aug. | ust; S. C. Type indiscernible.

67 Obv. ... M. A. ... Germ. P. M. Head of the Emperor with a crown of laurels. Rev. Gen. Cola. A Genius, standing before an altar with a sacrificial vessel and a cornucopiæ.

b. Egyptian.

68 Obv. *Map Avp ...* Head of the Emperor. Rev. Cos. *MHT ...*
ΩΝΜΙΙΓΑ ... ΚΟΕ.

Annia Faustina M. Antonini.

Copper.

69 Obv. Faustina Augusta. Head of the Empress (effaced). Legend illegible ... S. C. A figure standing with cornucopiæ and sacrificial vessel.—Donor H. Torrens, Esq.

70 Obv. Faustinae Aug. Pie Aug. F (i, V. Rev. Pudicitia. A figure seated.

71 Obv. | Faus | tina Augusta | Head of the Empress. Rev. Legend illegible. A figure standing before an altar.

L. Aelius Verus.

Copper.

72 Obv. ... (Cæs. L.) Aurel. Verus Aug. Head of Verus, crowned with laurels. Rev. Concord. Augustor. Tr. P. Cos. II. S. C. The two Cæsars, joining their hands. A. D. 161.

L. Aelius Aurelius Commodus (A. D. 180—192.)

Copper.

73 Obv. Imp. Aelius Cæsar Antoninus. Head of Commodus. Rev. A figure standing.

74 Obv. Imp. L. Ael. Cæs. oninus Pius. Bearded head of the Emperor. Rev. Tr. Pot... Cos. Des. II. Type. A figure standing, holding in the right a branch and in the left a cornucopiæ, A. D. 178.

75 Obv. Commodus Antoninus Aug. The same type. Rev. Vota D (e) c (enn | S) u | s | e Tr. P. VI. Imp. IV. Cos. (III) P. S. C. A stolated figure standing, and holding with the right a sacrificial vessel over an altar. A. D. 181. Vid. Med. p. 246.

76 Obv. M. Commodus Antoninus..... The same type. Rev..... Imp. VI. S. C. Type. A figure standing, in the right a caduceus, and in the left a shield, A. D. 182.

77 Obv. Leg. and type as in No. 74. Rev. T. R. (P.) VIII. Imp. V. IIII. P. P. S. C. Mars moving, in the right a Victory, in the left a javelin. A. D. 183. Vid. Med. p. 248.

78 Obv. The same legend and type as in 41. Rev... ... mp V. Cos. IV. The same type; duplicate of No. 77.

79 Obv. M. Commodus... The same type as in No. 75. Rev..... VIII. Imp. VI. Cos. IV. P. P. S. C. A helmeted figure | seated on trophies, holding with the left a spear, and with right a Victory. A. D. 183. Vid. Med. 248.

80 Obv. Commodus... ninus Aug. Pi... Head of the Emperor with radiated crown. Rev. Imp. VI. Cos. IIII. P. S. C. Minerva moving, a javelin in the right, in the left a shield.

81 Obv. Aelius Caesar Aug. ... Bearded head of Commodus with part of the bust. Rev. Tr. Pot. VIII. Cos. II (11) S. C. A female figure holding a sacrificial vessel over an altar. A. D. 183.

82 Obv. M. Commodus. A | nt. P. Feli | x Aug. Brit. Type as in No. 77. Rev. XI. Imp. VII. (1). Cos. (V.) S. C. Type. A figure standing, in the right a scale, in the left a cornucopiæ. A. D. 186. Vid. Med. p. 251.

83. Obv. M. Commodus Ant. P. Felix Aug. Brit. Type as in No. 75. Rev. | V. | rtuti Aug. P. N. Imp. VIII. Cos. (V.) ... S. C. Type. A helmeted soldier standing, in the right a Victory, in the left a spear, and at the feet a shield. A. D. 187. Vid. M. p. 252.

84 Obv. Comm. Ant. P. Felix (Brit.) The same type as in No. 75. Rev. r. P. XIII. Imp. VIII. Cos. V. P. (P.) S. C. exergue. For. Re | d | Fortune seated, in the right a team(over a globe,) in the left a cornucopiæ. A. D. 187. Vid. Med. P. 252.

85 Obv. M. Comm. Ant. (P.) Felix Aug. Brit. Type as in No. 79. Rev. (P.) M. (T) r P. XII. (1) p. VIII. Cos. V. P. P. S. C. A Victory moving, in the right a crown of laurels. A. D. 188. Vid. Med 253.

86 Obv. ... mmod. Ant. P. Felix Aug. Brit. The same type as in No. 75. Rev. Gen. A (ug. Ferlii) (P. M. Tr. P. XV.) Imp VIII. (Cos VI.) S. C. A Genius standing and holding with the the right a sacrificial vessel over a burning altar, and in the left a cornucopiæ. A. D. 190. Vid. Med. 255.

87 Obv. L. Ael. Aur. Commod Aug. P. Fel. The same type as in No. 75. Rev. XVII. Imp. VIII. Cos. VII. P. P. S. C. A figure standing, in the right apparently a caduceus, in the left a cornucopiæ. A. D. 192.

88 Obv. Aurel. Comm. Aug. P. Fel. The same type. Rev. Tr. P. XVII. Imp VIII. Cos. VII. The same type. Duplicate of No. 87.

89 Obv. Imp. Caes. ... Commodus. The same type as in No. 75. Rev. Illegible. S. C A figure standing, in the right a spear, in the left a shield.

90 Obv. M. Commodus Antoninus Aug. The same type as in No. 75. Rev. Legend illegible. S. C. Type. A Victory, holding with both hands apparently a military sign.

91 Obv. Legend illegible. Head of Commodus. Rev. Legend illegible. S. C. A figure seated holding in the right a globe, and leaning with the left on the chair.

92 to 95 Three Coins of Commodus.

Septimius Severus, (A. D. 194—111).

Copper.

96 Obv. | L. S. | ept. Sev. Pert. Aug. Bearded head of the Emperor, with a crown of laurels Rev. Legend illegible. S. C. A figure standing.

97 Obv. rus Aug. ... ax. Head of the Emperor, with a crown of laurel. Rev. VIII. Cos. IIII Three trophies raised on poles.

98 Obv. Legend illegible ; otherwise the same as the preceding.

Julia Aug. (Uxor Severi.)

Copper.

99 Obv. Julia | Do | mna Aug. Head of Julia. Rev. Victrici V | ener | i | S. C. Venus standing, half dressed, leaning on a column with the right, and holding an apple with the left. Med. p. 282.

Alexander Severus, (A. D. 225—235.)

Copper.

100 Obv. Imp. Caes. M. Aur. Sev. Alexander. Head of the Emperor with a crown of laurels and part of the bust. Rev. | Provide | ntia Deorum. S. C. The type of Providentia. A. D. 222. Vid. Med. p. 318.

101 Obv. xand. Aug. Head of the Emperor almost obliterated | Virt | us. Aug. A figure standing, in the left a spear, and in the right apparently a globe. A. D. 228. Vid. Med. p. 322. Found at Patna. — Donor — Rose, Esq.

102 Obv. Imp. Sev. Alexander Aug. The same type. Rev. Tr. P. VIII. Cos. II. S. C. A figure standing.

103 Obv. The same legend and type. Rev. P. M. Tr. P. VIII. Cos. II. (1) P. S. C. A figure standing, holding in the left a staff in a transversal direction.

104 Obv. The same legend and type. Rev. P. M. Tr. P. VIII. Cos. S, C. A soldier (the emperor, says Mediobarbus) holding in the right hand a globe, in the left a javelin, and kicking with the right foot a helm. A. D. 230. V. M. p. 323.

105. Obv. Imp. Alexander Pius Aug. The same type. Rev. XIII. Cos. III. S. C. The type of Sol moving. A. D. 234.

106 Obv. The same legend and type. Rev. Jovi Propugnatori. S. C. Type. Jupiter holding in its right the thunderbolt.

107 Imp. Alexander Pius Augustus. The same legend and type. Rev. Providentia Aug. S. C. The type of Providentia.

Julia Mamaea (mater Alexandri Severi.)

Copper.

108 Obv. Julia Mamaea Augusta. Head of Julia, with part of the bust. Rev. Fecunditas Augustae. S. C. A figure standing, and holding in the left a cornucopiæ. Med. p. 326.

Gordianus Imp. (A. D. 283—244.)

Copper.

109 Obv. Imp. Gordianus Pius Fel. Aug. Head of the Emperor, with a crown of laurels. Rev. Liberalitas Aug. III. S. C. A figure standing and holding in the right a die, and in the left a cornucopiæ. A. D. 242. V. Med. p. 339.

110 Obv. Imp. Gordianus Pius. The same type. Rev. ... Tr. P. IV. Cos. ... A figure seated, in the right a branch. A. D. 241. Vid. Med. p. 339.—Donor H. Torrens, Esq.

111. Obv. Imp. Caes. M. Ant. Gordianus Aug. The same type. Rev. Gloria. S. A. Victory standing.—Donor H. Torrens, Esq.

112 Obv. Imp. Gordianus Pius Fil. (III ?) Rev. Pax Aeterna. S. C. Type of Pax, (much effaced.) Donor H. Torrens, Esq.

113 Obv. Legend illegible. Head of the Emperor, with a wreath of laurels. Rev. A figure standing.

Philippus Arabs. (A. D. 242—49.)

Copper.

114 Obv. Imp. M. Jul. Philippus Aug. Bearded head of the Emperor with a crown of laurels. Rev. Felicitas Temp. A figure standing, in the right the caduceus, and in the left the cornucopiæ. A. D. 249. Vid. Med. p. 343.

115 Obv. The same Legend and Type as No. 114. Rev. Principi Juvent. S. A. A figure clothed in military garments (*figura paludata*) in the right a globe, and in the left a spear. A. D. 247. Vid. Med. p. 350.

116 Obv. The same Legend and Type. Rev. Aequitas. Aug. S. C. The type of Equity standing. A. D. 248. Vid. Med. p. 346.

117 Obv. Leg. Imp. ... ppus Aug. The same Type | ae | | culares | Aug. A stag standing. A. D. 248. Vid. Med. p. 345.

118. Obv. The same Legend as No. 114. Head of the Emperor, with radiated crown. Rev. A monument, on which is written Cos. III. Leg. S aecula. ... A. D. 248, Med. p. 346.

119 Obv. The same Legend and Type as No. 114. Rev. Liberalitas Aug. III. Two Emperors, seated on their subsellia. A. D. 248, Med. p. 346.

120 Obv. The same Legend and Type. Rev. Leg. Aug. Type. A figure standing, in its left holding a cornucopiæ.

121 Obv. Imp. M. Jul. Philippus. Bearded head of the Emperor, with a crown of laurels.— Rev. Saeculum Novum. S. C. A temple supported by eight columns, in the midst of which a figure is seated. A. D. 248. Vid. Med. p. 346.

Marcia Otacilia Severa (Philippi Imp. Uxor.)

Copper.

122 Obv. Marcia Otacilia Severa. Head of the Empress. Rev. Concordia Aug. S. C. A Concordia, with cornucopiæ and sacrificial vessel.

Cn. Messius Quintus Trajanus Decius. (A. D. 249—250.)

Copper.

123 Obv. Imp. C. M. Q. Trajanus Decius Aug. Head of the Emperor, with a crown of laurels. Rev. Dacia. S. C. A figure standing, and holding with the right apparently a military sign.

124 Obv. Imp. M. Q. Trajanus Decius Aug. Head of the Emperor, with radiated crown. Rev. | liberali | tas Aug. S. C. A standing figure holding in the right a bag, and in the left a cornucopiæ.

125 Obv. Imp. us Dec. ? Head of the Emperor, with a crown of laurels. Rev. Liberalitas Aug. A figure standing, and holding in the left a cornucopiæ.

P. Licinius Valerianus. (A. D. 254—260.)

Copper.

126 Obv. Imp. C. P. Lic. Valerianus ? Aug. Head of the Emperor, with a wreath of laurels. Rev. Concord. S. C. A standing figure, holding in the right a sacrificial vessel, and in the left a cornucopiæ. A. D. 254.

127 Obv. Imp. C. P. Lic. Valerianus. Aug. Head of the Emperor. Rev. Legend illegible, and the type much effaced.

Gallienus. (A. D. 254—268.)

Copper.

128 Obv. Gallienus Aug. Head of the Emperor with radiated crown. Rev. E. G. (X) I. .. Cl. VI. P. VI. T. Neptune standing, in the right a trident, in the left apparently a dolphin. A. D. 259. Vid. M. p. 373.

129 Obv. The same legend and type. Rev. elic. .. A figure seated, holding in its right a palm branch.

130 Obv. The same legend and type. Rev. Leg. Apollo. A figure standing.

131 Obv. The same legend and type. Rev. Probit. A female figure standing, and holding in the left a cornucopiæ.

132 Obv. The same legend and type. Rev. Jovi Victori. Jupiter standing and holding in his right the thunderbolt.

134 nus. The same type. Rev. Pax Aeterna Aug. A figure holding in the right a palm branch.

134-6 Three coins of Gallienus.

*M. Aurelius Victorinus. (A. D. 268.)**Copper.*

137 Obv. Imp. C. Victorinus P. F. Aug. Bearded head of the Emperor with radiated crown. Rev. Untraceable Found near Patna. Donor — Rose, Esq.

138 Obv. The same. Rev. A figure standing.

139 Obv. The same. Rev. Undistinguishable.

140 Obv. The same. Rev. (Pietas)? Aug. A figure standing, as it appears, before an altar.

141 Obv. The same. Rev. A figure standing.

142 Obv. The same. Rev. Providentia Aug. Type of Providentia.

143 and 144 Obv. The same. Rev. A figure standing.

*P. Piverus Tetricus. (A. D. 268.)**Copper.*

145 Obv. Imp. Tetr | icus | .. Bearded head of the Emperor with radiated crown. Rev. Aug. A figure standing, and holding in the right a spear.

146 Obv. Imp. C. Te | tricus | the same type. Rev. Victoria (Aug.) Victory moving, in the left a palm, in the right a crown of laurels.

147 Obv. .. icus.

*L. Domitius Aurelianus. (A. D. 270—275.)**Copper.*

148 Obv. Imp. Aurelianus Aug. Head of the Emperor with radiated crown and part of the bust. Rev. Jovi Conser. Two figures, standing opposite each other.

149 Obv. The same Legend. Head of the Emperor with a crown of laurels. Rev. Concordia Aug. The Emperor, in his left a spear and giving his right to the empress.

Probus. (A. D. 276—288.)

I. ROMAN COINS.

Copper.

150 Obv. Imp. C. Probus P. F. Aug. The head of the Emperor with radiated crown and bust, in his right holding the Roman eagle. R. Virtus Aug. 2. XX. T. A soldier standing, in his left shield and spear, in his right a Victory. A. D. 276. Med. p. 412.

151 Obv. Virtus Probi Aug. Head of the Emperor helmeted, in the right the spear, in the left the shield. Rev. Provident. Aug. S. XXI. C. A figure standing, in the right a globe, and in the left a transversal spear. A. D. 276.

152 Obv. The same Legend. Head of the Emperor with radiated crown and bust. Rev. Adventus August. The Emperor on horseback, his right raised, in his left holding the sceptre, a figure seated on the ground. A. D. 278. Med. p. 412.

153 Obv. The same Legend and Type. Rev. Fides milit. XXI. A figure standing, and holding in each hand a standard.

154 Obv. The same Legend and Type. Rev. Conservat Aug. T. XX. A naked Apollo with a glory round his head. The right hand raised, in the left a globe.

155 Obv. The same Type and Legend as No. 150. Rev. Virtus Augusti. A soldier holding in the left a spear, and touching the shield with the right.

156 Obv. The same. Rev. Pax. Aug. III.... XXI. A figure holding in the right a branch, in the left a spear in a transversal position.

157 Obv. The same. Rev. Soli Invicto C. M. XXI. S. Sol on his quadrigæ, surrounded by a glory.

II. EGYPTIAN COINS.

Copper.

158 Obv. ΚΜΑΥΡΠΠΟΒΟCЄEB. Head of the Emperor. Rev. L B. anno 2: An eagle, bearing a laurel wreath. A. D. 277.

M. Aurelius Carus. (A. D. 282—83.)

EGYPTIAN COINS

Copper.

159 Obv. ΚΑΡΟC. Donor H. Torrens, Esq.

160 Obv. ΑΚΜΑΚΑΡΟCЄEBβ. Head of the Emperor with a crown of laurels. Rev. L A. A. D. 282. A female, holding in the right a scale, and in the left a cornucopiæ.

161 The same.

162 Obv. ΑΚΜΑ ΚΑΡΟC ΣЄEB. Head of the Emperor with a crown of laurels. Rev. L B (anno 2) A. D. 283. Female, holding with the left hand her robe, and in the right a flower.

Diocletianus. (A. D. 284—304.)

I. ROMAN COINS.

Copper.

163 Obv. Imp. S. C. Val. Diocletianus. P. F. Aug. Head of the Emperor with radiated crown and bust. Rev. Jovi Conservat. S. XXX. T. Jupiter standing, in his left a spear, in his right a thunderbolt, and at his feet a boy. A. D. 284. Vid. Med. p. 224.

164 Obv. Imp. C. Val. Diocletianus. P. F. Aug. The same type as 163. Rev. The same Legend. Exerg. T. XXI. T. Type. Jupiter standing, in his left a spear, in his right the thunderbolt.

165 Obv. Imp. C. Val. Diocletianus Aug. Type as in No. 163. Rev. The same Type and Legend as in No. 115.

166 Obv. Legend and Type as in No. 163. Rev. Type and Legend as in No. 164.

167 Obv. Legend and Type as in No. 164. Rev. Legend and Type as in No. 163. Exerg. P. XXI. T.

168 Obv. Imp. C. C. Val. Diocletianus Aug. Type as usual. Rev. as in No. 163.

169 Obv. Imp. Diocletianus Aug. Head of the Emperor with radiated crown and

part of the bust. Rev. Jovi Conservat Aug. XXI. B. Type as in No. 163.

170 Duplicate of No. 169.

171 Obv. Legend and Type as in No. 164. Type as No. 160. Rev. Type and Legend as in No. 163. Exerg. S. XXI. T.

172 Obv. The Legend and Type as in No. 169. Rev. Legend and Type as in No. 169. Exerg. XXI. Δ

173 Duplicate of No. 172.

174 Duplicate No. 172.

175 Obv. Legend as in No. 163. Type as in No. 169. Rev. Jovi Conservatori XXI. T. Type as in No. 164.

176 Obv. Legend as No. 163. Rev. Leg. as in No. 163. Exerg. XXI. Δ . Type as in No. 164.

177 Duplicate of No. 176.

178 Duplicate of No. 176.

179 Obv. as No. 168. Rev. Legend and Type as No. 119. Exergue. XXI. t.

180 Duplicate of No. 179.

181 Duplicate of No. 179.

182 Duplicate of No. 179.

183 Obv. Legend as in No. 163. Type as in No. 166. Rev. Jovi Conserv. Aug. Jupiter standing, the spear in his left, the thunderbolt in his right, and the eagle at his feet E. $\times\times\Omega\text{IB}$.

184 Obv. Legend and Type as in No. 163. Rev. Jovi Conservat. III. XXI. T. Type as in No. 164.

185 Legend as in 172.

186 Obv. Legend as in No. 164. Rev. Herculi Conservat (P. XXI.) T. The naked Hercules standing, supporting his right on his hip, in his left the lion's skin and a club, leaning on a monument.

187 Obv. Imp. Diocletianus P. T. Aug. Head of the Emperor, with a crown of laurels and part of the bust. Rev. Salus Aug. et Caess. Fel. Part. A female figure standing, in her left a branch, in the right a bushel of ears.

II. EGYPTIAN COINS.

Copper.

188 Obv. .. $\Delta\text{IOKAHTIANOS}\Sigma\text{EB}$. Head of the Emperor with a crown of laurels. Rev. A female with wreath and cornucopiæ $\text{L}\Gamma$ (A 3) A. D. 286.

189 Obv. $\Delta\text{IOKLHTIANOS}\Sigma\text{EB}$ Rev. LH (a8.) Jupiter naked with a spear in the left, and the thunderbolt in the right. A. D. 292.

190 Obv. $\text{AIOK}\Gamma\text{HTIANOS}$. Rev. LI (anno 10.) The eagle bearing a wreath. A. D. 294.

191 Obv. The same legend. Rev. A female helmeted; in the right hand a Victory, in the left a cornucopiæ. A shield on the ground $\text{L}\Delta$ (anno 4.) A. D. 287.

192 Obv. $\text{AUT. OUA}\Delta\text{IOKLHTIANOS}\Sigma\text{EB}$. The same Legend. Rev. A Victory, holding in the right a wreath $\text{L}\Delta$ (anno 4.)

Maximianus. (A. D. 286—304.)

I. ROMAN COINS.

Copper.

193 Obv. Imp. Maximianus Aug. P. T. Head of the Emperor with a crown of laurels and part of the bust. Rev. Genio Populi Romani A. G. S. A genius standing, with cornucopiæ and sacrificial vessel. A. D. 285. Med. p. 431.

194 Obv. C. Val. Maximianus Nob. C. Head of the Emperor with a crown of laurels. Rev. Legend and Type as No. 193. Exerg. $\alpha\Theta$.

195 Obv. Imp. C. Ma. Maximianus. P. F. Aug. Type as No. 193.

196 Obv. Maximianus Nob. Caes. Type as No. 194. Rev. Type and Legend as No. 193.

197 Obv. Maximianus Aug. Type as No. 193. Rev. Genio Augusti B. Genius standing with the usual attributes.

198 Obv. Imp. C. Val. Maximianus Aug. Head of the Emperor, with a crown of laurels and the bust. Rev. Gen. Pop. Rom. N. P. L. Q. A genius standing before a burning altar, in his right a sacrificial vessel, in his left a cornucopiæ.

199 Obv. Imp. Maximianus P. F. Aug. Head of the Emperor with radiated crown and part of the bust. Rev. Jovi Conservat Aug. XXI. Γ . Jupiter standing, in his left a spear, in his right the thunderbolt.

200 Duplicate of No. 199.

201 Duplicate of No. 199.

202 Duplicate of No. 199.

203 Obv. Legend and Type as No. 199. Rev. The same. No Exergue.

204 Obv. The same as No. 199. Rev. The same Legend and Type. Exr. XXI. Δ

205 Obv. As in No. 199. Rev. Legend and Type as in No. 199. Exerg. XXI. A.

206 Duplicate of No. 205.

207 As. 199. Rev. Jupiter, standing, the eagle on his feet, and holding with his right a Victory.

208 Duplicate of No. 207.

209 Obv. Imp. C. M Val. Maximianus Aug. Type as No. 199. Rev. Legend and type as in No. 199. Exerg. T. XXI. T.

210 Obv. Imp. C. M. Val. Maximianus Aug. Type as No. 199. Rev. Jovi Conservat. Aug. S. XXI. T. No. 199.

211 Obv. Imp. C. Ma. Val. Maximianus. P. F. Aug. Type as No. 199. Rev. Legend and Type as No. 199. Exerg. P. XXI. T.

212 As No. 199. Rev. Legend as in No. 199. Jupiter standing, the spear in the left, the eagle on his feet, and holding with his right a Victory.

213 Obv. Legend and Type as in No. 199. Rev. Virtus Augg. XXI. S. Hercules standing, and holding in his right the club, in his left some thing indistinguishable.

214 Obv. Imp. Maximianus P. Aug. Usual type. Pax. Aug. A figure standing, holding in its right a Victory on a globe, and in its left a transversal spear. A. D. 294 Med. p. 434.

215 Obv. Imp. Maximianus Aug. Rev. Pax. Aug. A figure standing.

216 Obv. Imp. (C. Va.) Maximianus P. F. Aug. The same Type. Rev. Concordia Militum. K. E. Two figures standing, holding in their right joined hands, a Victory standing on a globe.

II. EGYPTIAN COINS.

Copper.

217 Obv. AKMA OYA MAΞ ΣΕΒ. Head of the Emperor, with wreath of laurels. Rev. ΛΑ anno 1. Female holding an olive branch and two cornucopiæ, a star on the left. A. D. 284.

218 Obv. Head of the emperor (much effaced.) Legend illegible ΛΔ. (anno. 4.)

219 Obv. MAΞ ΣΕΒ Rev. ΛΣ. An. 6. Rev. A winged female, holding a flower wreath in the right hand, and a palm branch in the left. A. D. 290.

220 Obv. AKMA OYA MAΞ ΣΕΒ. The same type. Rev. ΛΑ. A Victory, holding in the right hand a wreath of laurels.

221 Obv. ΝΟΣ ΣΕΒ. The same. Rev. Δ (anno 4, A. D. 287.) The same Type.

222 Obv. ΝΟΣ ΣΕΒ. The same Rev. ΛΔ (anno 4.) A. D. The same type.

Constantius. (A. D. 306—337.)

ROMAN COINS.

Copper.

223 Obv. Constantius Aug. Head of the emperor, with a crown of pearls, and part of the bust. Rev. B. | eata Tra | nquillitas. A basket, within which Votis XX. Exerg. P. T. R. A. D. 325. Med. p. 466.

224 Obv. The same as 223. Rev. D. N. Constantinus. Max Aug. Exerg. A. P. Q. A wreath, in which is inscribed Vot. XX. A. D. 325.

225 Obv. The same Legend. Head of the Emperor, adorned with two strings of pearls. Rev. Providentiæ Aug. S. M. K. A. The Pretorian camp, with a star above it. A. D. 330. Vid Med. p. 467.

226 Obv. The same as 223. Rev. The same excepting the Exergue, which is wanting.

227 Obv. The same as No. 223. Rev. Legend and Type as 225. Exerg.... T. S. T.

228 Obv. The same Legend. Head of the Emperor with a crown of laurels and part of the bust. Rev. Soli Invicto Comiti. T. T. Exerg. P. T. R. Sol with a radiated glory, his right raised, in his left a globe.

229 Obv. As in No. 228. The same Legend and Type. Inscription. S. C. Exergue. A. R. L.

230 Obv. As in No. 228. Rev. The same Legend and Type (effaced) Inscript (P. C.)

231 Obv. Constantius P. F. Aug. Usual Type. Rev. The same Legend and Type. T. on the left inscribed into a small wreath. Exerg. S. P.

232 Obv. As in No. 228. Rev. The same Legend and Type. Exerg. S. T. R. Inscript. T. T.

233 Obv. The same. Rev. Legend. Inscript. and Type the same. Exerg. P. L. C.

234 Obv. The same, excepting the Exergue, which is Ω I Ω.

235 Obv. The same as No. 228. Rev. The same excepting that F. T. is written instead of T. F. written.

236 Obv. Constantinus P. F. Aug. Head of the Emperor, with a crown of laurels and part of the bust. Rev. Legend and Type as in No. 228. Inscript. S. P. Exerg. M. S. L.

237 Obv. Imp. Constantinus Aug. Type as in No. 225, (effaced.) Rev. effaced, but we may recognize the figure of Sol, as in No. 228.

238 Obv. Imp. Constantinus. Aug. The same type. Rev. Soli Invicto Comiti. P. L. C. The same type.—Donor H. Torrens, Esq.

239 Obv. Imp. Constantinus. Aug. Laureled head of the Emperor, with the bust. Rev. Type of Sol. Legend illegible.—Donor H. Torrens, Esq.

240-41 Obv. Imp. Constantinus Aug. Laureled head of the Emperor, with bust. Rev. Legend and Type as in 228. S. C. Exerg. L. N.

(All these Coins from 228—241 were struck A. D. 309. Med. p. 461.)

242 Obv. Constantinus Aug. Head of the Emperor, with a crown of laurels. Rev. Germania Devicta. C. Exerg. P. L. C. Victory moving, in her left a palm, in her right a trophy, and a prisoner at her feet.

243 Obv. Constantinus Max. Aug. Head of the Emperor, with a broad crown and part of the bust. Rev. Gloria exercitus. S. M. N. C. Two soldiers armed with helmet, spear and shield, watching before two military signs.

244 Duplicate of the preceding.

245 Obv. . . . us P. F. Aug. The same type. Rev. Fel. Temp. Re | paratio | A soldier, the shield on his left arm, throwing down a horseman with his spear.

246 Obv. Imp. Const. . . . us T. F. Aug. Head of the Emperor (effaced.) Rev. (Fel.) Temp. Reparatio. Exerg. S. M. T. S. The same Type as No. 245.

247 Obv. Anti. . . Type as No. 245. Rev. As it appears, the same as No. 245. Donor H. Torrens, Esq.

248 D. Constant. . . . Aug. Head of the Emperor, crowned with two strings of pearls, and part of the bust. Rev. The same Legend and Type as No. 245. Exerg. Rob. Inscript. Γ.

249 Much effaced, the same Type and Legend as No. 245.

250 Obv. As No. 245. Rev. Legend and Type the same. Exerg. S. M. H. B.

251 The same.

252-53 Two Coins of Constantinus.

254 Obv. Constantinopolis. A female figure helmeted, with a spear and part of the bust. Rev. Exerg. T. R. P. A Victory, with spear and shield, on a ship.

255 The same.

256 Obv. Urbs Romæ. A female head, adorned with the tunica palmeata and bearing a crested helmet, being a representation of the town Roma. Rev. Exerg. S. M. T. S. E Romulus and Remus with the she-wolf. Above two stars.

257 to 269 Thirteen bad Coins of the same type.

1 M. Aurel. Val. Maxentius. (A. D. 306—312.)

Copper.

270 Obv. Maxentius. P. F. G. Aug. Rev. Victoria Æterna Aug. Nost. A Victory standing. This coin, the type of which is much obliterated, appears to be the same which is mentioned by Med. p. 450, where Victory writes on a shield Vot. XX. A. D. 307.

*Flav. Julius Crispus. (Caesar. A. D. 316-326.)**Copper.*

271 Obv. | Cr. | ispus Nob. C.... Helmeted head with bust, part of the shield and spear. Rev. (Beata) Tranquillitas. Votis XX. inscribed in a basket, above which a globe with three stars. A. D. 326. V. Med. p. 473. Found at Patna—Donor — Rose, Esq.

*C. Val. Licinianus Licinius. (A. D. 306-324.)**Copper.*

272 Obv. Imp. Val. Lic | inius | P. F. Aug. Head of the Emperor. Rev. Jovi.... ori. Of the Type the eagle only is discernible.

*Fl. Decentius. (Caesar A. D. 350-358.)**Copper.*

273 Obv. Mag. Decentius Nob. Cæs. Head of the Emperor with part of the bust. Rev. Vict. D. D. N. N. Aug. et Cæs. Two Victories raising a shield, within which Vot. V. Mult. X. and beneath it a star, A. D. 352. Med. p. 485.—Donor H. Torrens, Esq.

*Constantinus Jun. (A. D. 337-361.)**Copper.*

274 Obv. Constantinus Jun. Nob. C. Head of the Emperor with a crown of laurels and the bust. Rev. Providentiæ Cæss. sunt. The Pretorian camp with a Star above it.

275 Obv. Constantinus Jun. Nob. C. Helmeted head of the Emperor with bust. Rev. Beat. Tranquillitas. Exerg. Plon. Inscript. T. B. A basket, in which Vot. XX. and above which a globe with three stars. A. D. 335.

*Constantius. (A. D. 337-351.)**Copper.*

276 Obv. Fl. Jul. Constantius Nob. C. Head of the Emperor with part of the bust. Rev. Gloria Exercitus. Exerg. S. M. N. D. Two soldiers with shield and spear, watching before two military signs.

277 The same, excepting the Exerg., which is M. A. L. D.

278 Obv. D. M. Constantinus, P. F. Aug. Head of the Emperor with two strings of pearls, and part of the bust. Rev. Fel. Temp. Reparatio Sin. III. The Emperor, in a ship, holding in his right a globe, in his left a spear. Victory, above which a star, sitting on the helm.—Donor H. Torrens, Esq.

279 Obv. The same Legend. Head of the Emperor, crowned with laurels, with part of the bust. Rev. Gerio Populi Romani. B. A Genjus standing before a burning altar.

280 Obv. Constantius Nob. Cæs. Head of the Emperor, with a crown of laurels, forming a circle round the middle of the head. Rev. The same legend and type as No. 277. Ex. L. P.

281 Obv. The same as No. 277. Rev. effaced.

282 Obv. Head of the Emperor, adorned with two strings of pearls. Rev. untraceable. Found at Patna-Donor. — Rose, Esq.

283 tius Aug. Head of the Emperor, adorned with two strings of pearls. Rev. A figure standing, in the left a globe, and in the right apparently a trident.

284 to 289 Six Coins of Constantius.

Fl. Theodosius Magnus.

Copper.

290 to 92 . . . dosius P. F. Head of the Emperor. Rev. (Gloria) Romanorum. Three figures (Med. thinks them to represent the Emperor with his sons Arcadius and Honorius. V. Med. p. 519) standing and armed with spears. Found at Mahabalipuram, and formerly belonging to Col. Mackenzie's Cabinet. A. D. 393.

Fl. Anicius Justinianus. (A. D. 527-65.)

Copper.

293 Obv nus P. P. Aug. Head of the emperor with jewelled head-dress and bust, holding in the right a globe with star, on the left a star. Rev. A + A. D. 548.

A	+	A	D.	548.
n	|	x		
n	|	x		
o	|	||		
4HUN				

Fl. Anicius Justinus Jun. (A. D. 565-78.)

Copper.

294 Obv inus P. F. Aug. Head of the Emperor almost effaced. Rev. +

M

Con.

Fl. Tiber Mauricius. (A. D. 582-62.)

Copper.

295 Obv P. P. Aug. Face apparently of Mauritius, with jewelled head-dress and bust, hold in the right a globe and cross. Rev. A A. D. 585. V. Med p. 576.

NMΠ
NC
O Π

Joh. Zimias.

Copper.

296 Obv. Head apparently of Christ, almost obliterated. Rev. **XRISTO SBASIA**. Vid. Band. p. 738, where the full Inscription is given, **XPISTOS BASIAEYS BASIAEON**. A. D. 970.

ADDITIONS.

*C. Jul. Ver. Maximinus. (A. D. 235.)**Copper.*

297 Obv. Imp. Maximinus Pius Aug. Laureled head of the Emperor with part of the bust. Rev. Providentia, Aug. S. C. Type of Providentia; a globe at her feet.

298 The same Obverse. Rev. Fides Militum S. C. A figure holding in each hand a military sign.

299 Obv. Caesa. Trajanus Ha.... Head of the Emperor with radiated crown. Rev... r Pot. Cos. I. S. C. Exergue. ac. A figure seated, in the left a cornucopiæ.

300 Obv. Legend effaced. Head of the Emperor (Gallienus) with radiated crown. Rev. ...ollo Cos. A figure standing.

301 A Coin of Crispus.

302 to 313 Twelve Coins of Constantinus.

314 to 323 Ten Coins of Roman Emperors.

224 to 397 Seventy-three bad Roman Coins.

B. CATALOGUE OF GRECIAN COINS.

1. *Coins of Greek Towns.*

1-2 Two Milesian coins, (copper.)

3 A silver tetradrachma. A lion moving with raised head. Double triangular symbol, surrounded by stars. Rev. Jupiter seated; legend illegible. Described by Mr. J. Prinsep, *Asiat Journ.* p. 31.

2. COINS OF GREEK KINGS.

1. *Macedonian of Kings.*

4 A silver drachma. Obv. Head of Hercules beardless, covered with the lion's skin. Rev. Jupiter seated, holding an eagle in the right, and a staff in the left; on the left side ΑΛΕ ΞΑΝΔΡΟΥ, below.. ΑΣΙΑΕ... Described by J. Prinsep, *Asiat Journ.* Vol. II. p. 31.

5 Another similar coin, semidrachma. Rev. ..ΞΑΝΔΡ.. on the field to the left M.

6 Another tetrachma of similar device. Legend illegible. *Asiat. Journ.* Vol. II., p. 31.

7 Another tetradrachma of similar device. Legend illegible.

2. *Syrian Kings.*

8 Silver drachma. Head of Demetrius with simple band. Rev. Jupiter seated on a solid altar, holding the thunderbolt. Down the sides ΒΑΣΙΛΕΩΣ ΔΗΜΗΤΡ-ΠΙΟΥ. Mr. Prinsep remarks (*Asiat. Journ.* Vol. II, p. 32,) with regard to this coin: This coin of Demetrius is recognised to be Seleucidan, from the figure of Apollo, sitting upon a peculiar altar, described by Pinkerton as a hamper inverted.

3. *Ægyptian Kings.*

9. A silver tetradrachm, brought from Egypt by Mr. Drew. Obv. Head of the King with curled hair, encircled by a diadem. Rev. Jupiter's eagle, standing on a thunderbolt. Leg. ΠΤΟΛΕΜΑΙΟΥ ΒΑΣΙΛΕΩΣ ΙΑΛΙΗ (anno 18.) Mr. Prinsep observes concerning this coin—A coin of Ptolemy I. or the V, B. C. 204. as Pinkerton says, his coins have most the letters ΠΑ or ΣΑ, explained to signify Paphos or Salamis, both cities of Cyprus.

10 Another. Same device ΛΗ Anno 8.

11 Another D. D. ΛΙΑ Anno 14.

12 Another D. D. ΛΙΕ Anno 15.

13 Another D. D. ΛΙΑ Anno 18.

14 A large copper coin. Head of the King with curled hair. Rev. An eagle..

ΛΕΜΑΙΟ... ΒΑ.. Ε.

15 Another copper coin.

16 Copper coin of a King unknown.

4. INDO-GRECIAN KINGS.

a. Eukratides.

17 Obv. Square copper coin. Helmeted head of the King. Rev. The two Dioscuri, as it appears, charging. Owing to this type, which is that of Eukratides, and the head of the King, it has been appropriated to that prince.

b. Menander.

18 Silver tetradrachma. Obv. ΒΑΣΙΛΕΩΣ ΣΩΤΗΡΟΣ ΜΕΝΑΝΔΡΟΥ. Head of the King with fillet and part of the bust, with the right hand throwing a thunderbolt. R. מְנַנְדָּא טַדַּטַּסָּא מִנַּדַּסָּא (Moharajara Tadataasa Minadasa.) Minerva facing the right, in the left the Ægis, with the right throwing a spear. Monogram.

19. The same Obverse. Rev. The same type and monogram. Legend פֶּאָל פֶּרַרְר פֶּוֹרְרֶוּ.

20 The same.

21 The same Obverse. Rev. The same legend. Monogram. Minerva facing the left, the thunderbolt in the right, and the Ægis in the left.

22 The same legend and type. Rev. The same, excepting that the monogram is to the left of Minerva, instead of to the right. The same legend, well preserved.

23 The same legend. Helmeted head of the King. Rev. The same legend. Minerva facing the left with monogram on the left.

24 The same.

25 The same with exception of the monogram, which is as in 21.

26 Copper coin, totally effaced; visible only the letter ME.

c. Hermes (?)

27 Copper head of the King, much effaced. Legend not traceable.

28 Another similar one.

- 29 Head of the King effaced. Grecian and Cabulian legend illegible.
30 A Coin of an Indo-Grecian King.

*G. Coins of the successors of the Indo-Grecian Kings P. Barbaric Kings of
Caulbul. Great King of Kings.*

COPPER.

- 1 Obv. not discernible. Rev. King on horseback to the right. Leg.

ΕΥΣΒΑΣ.

- 2-3 Two more.

4-5 Head of the King with a curly hair and flowing fillets. Rev. ΑΕ
ΒΑΣΙΛΑΣ. A horseman mounted with flowing ribbands; before him a
three-pronged symbol, the complete legend is Σωτηρμεγας βασιλεις
βασιλεων Wils A. A. p. 333, remarks: The position of the first of the series, if
there was a succession, or if the individual, if alone, is undoubtedly subsequent to the
Greek Kings of Cabul. The title of great King of Kings connects him with Azes,
and that he was posterior to Azes, is indicated by a peculiar symbol, a trident with
three prongs.

- 6-9 Four coins more.

2. Coins of the Indo-Scythian Kings of Caulbul.

Kadphises.

COPPER.

- 10 Obv. King standing to the front with conical hat. Rev. effaced.

- 11 Another similar one.

- 12 Another of smaller size.

- 13-16 Four more.

17 Obv. Head of the King with Grecian legend illegible. Rev. Standing Hercules,
Cabulian legend.

- 18-19. Two similar ones.

20 Cast of a gold coin. Figure of the King to the right with cap, the front of which
projects to the right, and fillets, club in his right, carried in a car, drawn by two
horses and driven by a minutive charioteer. ΒΑΣΙΛΕΥΕ ΟΟ ΗΜΟ ΚΑΔ
ΦΙΧΗ. Rev. Naked figure to the front wearing a cap, the right hand rests
on a trident.

- 21 Head of the King. In other respects the same with the preceding.

- 22 A similar one.

Kanerkes.

COPPER.

23 Obv. King standing to the right with coat, conical cap, and fillets, his right hand
pointing downwards to an altar.

- 24-31 Eight coins of Kanerkes, much obliterated.

- 32 King standing before an altar. Rev. A figure with nimbus. Legend illegible.

33 King in Scythian dress, standing. Rev. Figure of an elephant.

34-37 Four similar coins.

38-41 Four coins more.

Ooerki.

GOLD.

42 Obv. Bust of the King with high cap to the left, a club in his right. PAO
oo HPKI KOPANO. Rev. Standing figure to the left, halo and rays round
the head, the right extended, the left holding the hilt of the sword. Mon. MIPO.

Baraora.

43 Obv. Cast of middle size. PAO NANO King standing to the left with curious cap and clad in mail; in the left holding a trident, the right pointing down to an altar, sword at the side. Leg. Rev. PAONAPAO. Figure of Shiva with hair hanging down both sides of the head; upper half of the body naked, the lower covered; behind him the bull, to the left a Monogram.

44-50 Seven more.

51 Obv. A figure of Kenorao seated cross-legged, with fillets and left hand raised. Rev. A figure standing. V. W. p. 368.

52-102 Fifty one Indo.-Scythian coins.

D. Parthian or Arsakian Coins.

103 A silver tetradrachma. Head of Arsaces (I.?) facing the right, with broad diadem and straight hair. R. Victory offering a crown to the King seated. Leg. ΒΑΣΙΛΕΩΣ ΒΑΣΙΛΕΩΝ ΕΥΕΡΓΕΤΟΥ ΕΠΙΦΑΝΟΥ ΦΙΛ ΕΛΛΗΝΟΥ. Asiat. Jour. Vol. II. p. 34.

104 Obv. Silver tetradrachma. Head with mitred cap, and this symbol behind it. Rev. Figure seated, holding a bow. Leg. ΒΑΣΙΛΕΩΣ ΕΠΙΦΑΝΟΥΣ.

ΜΕΓΑΛΟΥ ΑΡΣΑΚΟΥ ΔΙΚΑΙΟΥ ΦΙΛΕΛΛΗΝΟΥ.

According to the shape of the Greek characters of this coin it must belong to one of the first Arsaces.

105 Head with mitred cap and aquiline nose, well executed. Rev. Figure seated, holding a bow, under which there is a kind of altar formed like the letter A. Leg. ΒΑΣΙΛΕΩΣ ΒΑΣΙΛΕΩΝ ΕΥΕΡΤΕΤΟΥ ΔΙΚΑΙΟΥ ΕΠΙΦΑΝΟΥΣ ΦΙΛΕΛΛΗΝΟΥ. Character well delineated.

106 Another. Plain head dress; device and character very rude.

107 The same, but more legible.

108-9 Two similar ones.

110 Another, inscription legible, but in rude characters.

111 Another, Head of the King, to its right and left the moon and star. Rev. The same device, on the left of the figure this sign ϕ

112 Another, with entirely barbarous character.

113 Head of the King with aquiline nose and pointed beard. Rev. A figure in

trowsers, seated with bow. Leg. ΒΑΣΙ ΛΕΩΣ ΑΡΣΑΚΟΥ ΕΠΙΦΑΝ
ΟΥΣ ΦΙΛΕΛΛΗ.

114 Obv. Head of the King with deep turban and mitred cap; bow behind, with fillets of the rudest fabrication. Rev. The same device. Character quite perverted.

E. Sassanian Coins.

115 Tetradrachm. Head of the King, with a cap or crown and curled hair. Rev. Sitting Hercules. Leg. in Cabulian character, 𐎧𐎡𐎧𐎡𐎧𐎡𐎧𐎡. Asiat. Journ. II, p. 312. Wilson A. A. p. 225.

116 Head of the King, facing the left, with a large tuft of curly hair and a peculiar cap; round it the legend in Cabulian characters almost obliterated. Rev. A fire altar (mithra) with the head of the King upon it, two priests on both sides with swords. Asiat. Journ. II. p. 36.

F. Hindoo Coins.

Chandra Gupta series.

117 A Gold Coin. Obv. Figure to the left standing, with a halo round the head, a bow in the left. Legend imperfectly legible. Rev. A female, sitting cross-legged, the left hand supported on her hip. Asiat. Journ. Vol. V. p. 648. Asiat. Res. Vol. XVII.

Librarian's Annual Report.

Abstract of the List of Books, received into the Library, from the 21st January to the 31st December, 1842.

The number of all the Books, large and small, in different Languages, amounts to 259.

English.

Abstract of the Proceedings of a Committee for investigation of the Coal and Mineral Resources of India. Calcutta, 1842, (two copies.) 2 vols.

Address at the Anniversary Meeting of the Royal Geographical Society. London, 1841-1842. 2 pamphlets.

Annals and Magazine of Natural History, Nos. 47 to 59,—13 Nos. and Parts.

Annual Report of the Transactions of the Bombay Chamber of Commerce. 1840-41, 1 vol.

Ballantyne's Elements of Hindi and Braj-Bhaka Grammar. London, 1839, 1 vol.

——— Grammar of the Mahratta Language. London, 1839, 1 vol.

Baptist Missionary Magazine. Boston, No. 8.

Busawan Lal's Memoirs of the Puthan Sodier of Fortune. Calcutta, 1832, 1 vol.

Calcutta Christian Observer. New Series, 1842, vol. iii, 1 vol.

Calcutta Literary Gleaner, 1842, Nos. 1 to 8 and 10 (Nos. 4 two copies,) 10 Nos.

Calcutta Monthly Journal, 3rd Series, 1842. Nos. 83 and 84.—2 Nos.

Cantor's Zoological Sketch of Chusan. M. S. 1 vol.

Catalogue Gallery. London, 1840, vol. v.

- Correspondence regarding the Discovery of the Tea Plant of Assam. Calcutta, 1841.
1 Pamphlet.
- Cunningham's Map of the Comparative Geography of Central Asia, 1 No.
- Darwin's Structure and Distribution of Coral Reefs. London, 1842, 1 vol.
- Heynen's Tracts, Historical and Statistical, on India. London, 1814, 1 vol.
- Ibraheem's Grammar of the Persian Language. London, 1841, 1 vol.
- Irvine's Account of the General and Medical Topography of Ajmeer. Calcutta, 1841. 1 pamphlet.
- Jameson's Edinburgh New Philosophical Journal, Nos. 62, and 64, two copies, and 65, 4 Nos.
- Journal of the Bombay Branch of the Royal Asiatic Society. Nos. 2, 3.
- Journal of the Royal Asiatic Society of Great Britain and Ireland. London, Vol. v. No. 10. four copies ; Vol. vi. No. 12. 5 Nos.
- Journal of the Royal Geographical Society of London. Vol. x, Parts, 1, 2, 3 ; Vol. xi, Parts, 1, 2. 5 Nos.
- Kerr's Sketch of Upper Assam. 1 vol.
- Kittoe's Illustrations of Indian Architecture. 1 Vol., 4 Nos.
- Lane's Dictionary, English and Burmese. Calcutta, 1841, 3 copies.
- Lardner's Cabinet Cyclopædia—Natural Philosophy, Vol. i.
- Laws and Regulations of the Egyptian Society. 1 pamphlet.
- List of the Members of the Royal Asiatic Society of Great Britain and Ireland. 1841, 1 pamphlet.
- London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science. 3rd Series, Vol. xix, Nos. 122 to 127 ; Vol. xx, Nos. 128 to 134 ; Vol. xxi. Nos. 135, 14 Nos.
- Lyell's Principles of Geology. 6th Edition. London, 1840, 3 vols.
- Mackenzie's (Col.) Plates, (13 pieces,)—13 Nos.
- Macpherson's Report upon the Khonds of the districts of Ganjam and Cuttack. 1842, 2 copies.
- McCosh's Medical Advice to the Indian Stranger. London, 1841, 1 vol.
- Memoirs of the Royal Astronomical Society. London, 1840, Vol. xi.
- Minutes of the Committee of Council on Education, 1840-41.—1 vol.
- Moor's Notices of the Malayan Archipelago and adjacent Countries. Singapore, 1837, 1 vol.
- Naturalist's Library—Entomology, Vol. vii., Foreign Moths. 1 vol.
————— Ichthyology, Vol. iii., Fishes of Guiana. 1 vol.
————— Mammalia, Vol. xi., Marsupials and Vol. xii. Horses, 2 vol.
————— Ornithology, Vol. xii. British Birds. 1 vol.
- Newbold on the Ipoh or Upas Poison, used by the Jacoons and other Aboriginal Tribes of the Malay Peninsula. London, 1837, 1 pamphlet.
- Pemberton's Report on Bootan. Calcutta, 1839, 1 vol.
- Prinsep's Runjeet Singh. Calcutta, 1834, (defective,) 1 vol.
- Proceedings of the American Philosophical Society. 1841, Vol. ii., No. 17.

- Proceedings of the Geological Society of London, 1841, Part ii. Nos. 76 to 83, 8 Nos.
- of the London Electrical Society. Session 1841-42. London, Parts i. and iv, 2 Nos.
- of the Royal Asiatic Society of Great Britain and Ireland. London, 1841, 1 Nos.
- of the Zoological Society of London, 1840, parts viii.—1 No. and parts.
- Reports of the British Association for the Advancement of Science. London, 1838, Vol. vii. and 1842, Vol. x, 2 vols.
- (Sixth) of the Egyptian Society. 1842, 1 pamphlet.
- on Projected Canals in the Delhi Territory, Allahabad. 1 vol.
- on the Settlement of the District of Seharunpore, compiled by E. Thornton, 1840, 2 vols.
- on the Training of Pauper Children, 1841, 1 vol.
- Roget's Explanation of an optical deception. London, 1835, 1 pamphlet.
- Royle on the Production of Isinglass along the Coast of India. London, 1842, two copies.
- Sabine's Narrative of an Expedition to the Polar Sea. London, 1840.—1 vol.
- Scott and Co's, Bengal Directory for 1842, 1 vol.
- Silurian System, from the Edinburgh Review. 1841, 1 pamphlet.
- Sketch in English and Khampti Characters, M. S. (a sheet,)
- Society for the Encouragement of Arts, &c. Premiums for 1840-41, 1841-42. London, 1840, (six copies,) 6 pamphlets.
- Sprenger's El-Mas'udis' Historical Encyclopædia. London, 1841, Vol. i. 1 vol.
- Spry's Plants, &c. required for India. Calcutta, 1841, 5 copies.
- Sykes's Fishes of the Dukhun, (pages 349 to 378,) 1 vol.
- Notes on the Religious, Moral and Political State of Antient India. London, 1841, 1 vol.
- Transactions of the Agricultural and Horticultural Society of India. Vol. viii., 1 vol.
- of the Geological Society of London, 1841, 2nd Series, Vol. vi. 1 vol.
- of the London Electrical Society from 1837 to 1840, London. 1841, 1 vol.
- of the Medical and Physical Society of Bombay, 1841, No. 4, 1 No.
- of the Royal Society of Edinburgh, 1841, Vol. xv., Part 1, 1 No.
- of the Society for the Encouragement of Arts, &c. Vol. liii. Part i., 1 No.
- of the Zoological Society of London, 1841. Vol. ii. part 5, 1 No.
- Trials of P. and M. Wallace. London, 1841, 1 vol.
- Wight's Icones Plantarum Indiæ Orientalis. Vol. ii. Part 3, 1 No.
- Wilson's Ariana Antiqua. London, 1841, 5 copies.
- Sanskrit Grammar. London, 1841, 2 copies,
- Translation of the Vishnu Purana. London, 1840, 1 vol.
- Wujra Soochi, or Refutation of the Arguments upon which the Brahmanical Institution of Caste is founded, translated by B. H. Hodgson, 1839, 1 pamphlet.
- Yarrell's History of British Birds. Vol. iii. Parts 26 to 30, 5 Nos.

French.

Actes de L'Academie Royale des Sciences, Belles Lettres et Arts de Bordeaux.
1839, 1 vol.

Adam, L'Espagne Artistique et Monumental, planches lithographies. 1 vol.

Annuaire du Bureau de Longitudes. Paris, 1836, 1 vol.

Bulletin de la Société de Géographie. 3me Serie. Paris, tomes, xv et xvi. 2 vols.

Catalogue de la Librairie D'Ab. Cherbuliez et Cie. à Paris et à Genève, 1 pamphlet.

Cuvier, Histoire Naturelle de Poissons. Paris, 1842, Tome, xvi, 1 vol.

Desjardins, Observations Meteorologiques faites a flacq. (a sheet.)

Foucaux, specimen du Gya-tcher-rol-pa, Partie du Chapitre vii. contenant la naissance de Cakya-Muni. Paris, 1841, 1 pamphlet.

Journal Asiatique, 3me Serie. Paris tome x, Nos. 56 à 58, tome xi, Nos. 59 à 64, tome xii, Nos. 65 à 69, tome xiii, Nos. 70, 71, 72, 16 Nos.

Journal des Savants. Paris, 1841, Mai à Decembre, et 1842, Janvier à Juin, 14 Nos.

Macaire et Auguste, Experiences pour servir a l'histoire de l'Acide Muriatique.
Genève, 1824, 1 vol.

Macarie-Prinsep, Memoire sur l'influence des Poisons. Geneve, 1825, 2 pamphlets.

Marcel, Contes Arabes du Cheykh El-Mohdy. Paris, 1833, 6e, 7e, 12e Livraisons,
3 Nos.

— de l'Action des Poisons sur le Regne Vegetal. Geneve, 1825, 1 pamphlet.

Mémoire de la Société de Physique et d'Histoire Naturelle de Geneve. Tome viii,
1ere et 2me parties, (two copies each,) tome ix, 1re partie, 5 Nos.

Programme de la Société Royale D'Agriculture et de Commerce de Caen. 1 pamphlet.

Reponse de M. de Paraveyà l'Article de M. Riamburgh sur l'Antiquités Chinoisas.
Paris, 1836, 1 pamphlet.

Voyage Autour du Monde par les Mers de L'Inde et de Chine de M. Laplace. Paris, 1839, tome v, 1 vol.

Latin.

Callery, Systema Phoneticum Scripturæ Sinicæ. pars 1a and 2da, 2 Nos.

Hesyehii Glossographi Discipulus. Edidit B. Kopitar. Vindobonæ, 1840, 1 pamphlet.

Glossarium Archæologicum. Authore H. Spelmanno. London, 1687, 1 vol.

German.

Bopp, über die Verwandtschaft der Malayisch Polynessischen, Sprachen, &c. Berlin, 1841, 1 vol.

Geschichte der Ilchane, dast ist, der Mongolen in Persien, Von Hammer. Easter-Band, 1 vol.

Hammer, Gamachscharís Goldene Halsbänder. Wien, 1835, 1 pamphlet.

Jahrbücher der Literatur, Nos. 93 to 96, 4 Nos.

Lassen, Zeitschrift für die Kunde des Morgenlandes, iv. Bd. i. Heft, 1 No.

Dutch.

Vosmaer's Baai of Kendari, Trigonometrisch Opgeuomen, Outdekt, 1831 (Map,) 1 No.

Italian.

Di un Vaso Greco Dipinto che si Conserva nel real Museo Borbonico Discorso del Cavalier Bernardo Quaranta, 1 pamphlet.

Sula Figura et L'Iscrizione egizia in cise in uno smeraldo Quaranta. Napoli, 1826, 1 pamphlet.

Arabic.

Diwani Mootanubee. Hooghly, 1841, 1 vol.

Aafhatul Yaman. Hooghly, 1841, 1 vol.

Merrat-ul-Janaun, Maroof Tarikh-ia-phai, 1 vol.

Persian.

Tarikh Ferishta, 2 vols.

Hindee.

Naphasil, Lagawd, 1 vol.

Masnabee, Kanoor, 1 vol.

Raja Bolee, written in Bengalee Characters (Potee,) 1 vol.

Sanscrit.

Sahitya Derpana, 1828, 2 copies, Potee.

Burmese.

The Holy Bible, containing the Old and New Testament, 2d Edition. Moulmain, 1840, 1 vol.

Amount of Books in each Language.

English,	-	-	-	-	-	-	179
French,	-	-	-	-	-	-	54
Latin,	-	-	-	-	-	-	4
German,	-	-	-	-	-	-	8
Dutch,	-	-	-	-	-	-	1
Italian,	-	-	-	-	-	-	2
Arabic,	-	-	-	-	-	-	3
Persian,	-	-	-	-	-	-	2
Hindee,	-	-	-	-	-	-	3
Sanscrit,	-	-	-	-	-	-	2
Burmese,	-	-	-	-	-	-	1
Total,	-	-	-	-	-	-	259

Oriental Publications, &c. sold from the 10th January up to the 27th December, 1842.

Mahabharata, Vol. i. 8 copies; ii. 7 do.; iii. 9 do.; iv. 9 do.	..	Rs.	330	0	0
Index to do. Vol. i. 4 copies; ii. 3 do. iii. 3 do. iv. 3 do.	..	..	19	8	0
Raja Taringini. one copy.	..	..	5	0	0
Naishada, one copy.	..	..	6	0	0
Sausruta, Vol. 1 and 2, one copy each.	..	..	8	0	0
Fatawé Alemgiri, Vol. i. 2 copies; ii. 1 copy; iii. 7 copies; iv. 10 do.	..	..	279	0	0
v. 7 do.; vi. 7 do.	..	..	5	0	0
Anis ul Musharrahin, one copy.	..	..	4	0	0
Jawame ul Ilm ul Riazi, one copy.	..	..	1	0	0
Persian Catalogue, one copy.	..	..	80	0	0
Asiatic Researches, Vols. xiii. to xx. and Index	..	..	70	0	0
Journal of the Asiatic Society, Vols. ix, x. and 11 Nos.	..	..	32	0	0
Sharaya ul Islam, 4 copies.	..	..	
Total Rupees	....		839	8	0

ABSTRACT.

Account of the Oriental Publications, delivered, sold, and in-store, from May 1838 to the 31st December, 1842.

Mahabharata.

	Vols.	1	2	3	4
Found and Received,	Copies	289	301	330	477
Delivered and Sold,	„	35	35	36	158
Balance,	„	254	269	294	319

Index to Mahabharat.

	Vols.	1	2	3	4
Found and Received,	Copies	489	491	498	493
Delivered and Sold,	„	32	31	32	108
Balance,	„	457	460	466	385

Harriwansa.

Found and Received, ....	.....	.....	.....	.....	Copies	494
Sold, ....	.....	.....	.....	.....	„	5
Balance, ....	.....	.....	„	.....		489

Raja Taringini.

Found and Received, ....	.....	.....	.....	.....	Copies,	309
Delivered and Sold, ....	.....	.....	.....	.....	„	23
Balance, ....	.....	.....	„	.....		286

Naishadu.

Found and Received, ....	.....	.....	.....	.....	Copies	244
Delivered and Sold, ....	.....	.....	.....	.....	„	25
Balance, ....	.....	.....	„	.....		219

Sausruta.

	Vols.	1	2
Found and Received,	Copies	287	331
Delivered and Sold,	„	26	27
Balance,	„	261	307

Sanscrit Catalogue.

Found in the Library, ....	.....	.....	.....	.....	Copies	271
Delivered and Sold, ....	.....	.....	.....	.....	„	16
Balance, ....	.....	.....	„	.....		255

Fatawe Alemgiri.

	Vols.	1	2	3	4	5	6
Found and Received,	Copies 141	101	35	109	155	165
Delivered and Sold,	„ 54	4	16	25	27	28
Balance,	„ 87	97	19	84	128	137

Innaya.

	Vols.	1	2	3	4	
Found and Received,	Copies 0	38	31	33
Delivered,	„ 0	2	2	2
Balance,	„ 0	36	29	31

Khazanath-ool-Ilm.

Found and Received, ....	....	....	....	....	Copies 147
Delivered and Sold, ....	....	....	....	....	„ 54
Balance, ....	....	....	....	„	93

Jawame ul Ilm ul Riazi.

Found and Received, ....	....	....	....	....	Copies 435
Delivered and Sold, ....	....	....	....	....	„ 41
Balance, ....	....	....	....	„	394

Anis ul Musharrahin.

Found and Received, ....	....	....	....	....	Copies 365
Delivered and Sold, ....	....	....	....	....	„ 48
Balance, ....	....	....	....	„	317

Sharaya-ool-Islam.

Found in the Library, ....	....	....	....	....	Copies 500
Delivered and Sold, ....	....	....	....	....	„ 165
Balance, ....	....	....	....	„	335

Persian Catalogue.

Found in the Library, ....	....	....	....	....	Copies 262
Delivered and Sold, ....	....	....	....	....	„ 24
Balance, ....	....	....	....	„	238

Asiatic Researches.

	Vols.	3	7	8	9	11	12	13	14	15	16	17	18	18	18	19	19	19	20	20	20
Found & Received,	4	1	3	2	1	10	45	61	70	118	229	91	163	54	150	40	233	246	30	260	112
Delivered & Sold,	1	0	0	0	0	5	14	14	14	20	16	22	12	8	22	14	137	11	18	131	15
Balance,	3	1	3	2	1	5	31	47	56	98	213	69	151	46	128	26	96	235	12	129	141

Tibetan Grammar.

Found and Received, ....	....	....	....	....	Copies	211
Delivered, ....	....	....	....	....	„	3
			Balance, ....	....	„	208

Tibetan Dictionary.

Found and Received, ....	....	....	....	....	Copies	208
Delivered, ....	....	....	....	....	„	3
			Balance, ....	....	„	205

Read Report of Curator Museum Economic Geology as follows :—

Report of the Curator Museum of Economic Geology for January, 1843.

MUSEUM ECONOMIC GEOLOGY.—We have received during this month, through Major Fitzgerald, Superintending Engineer S. E. Provinces, from Mr. Babington, Executive Officer on the Raepore Mail Road, a capital series of ores and mining products from the Kuttarbugga iron mine, 20 miles N. E. of Sumbulpore.

This collection is the most complete we have yet received, for it comprises every thing, from the crude ore to the finished product, which is noted by me as desirable in our circular, including a capital earthen model of the furnace, to scale, the tools, &c.

The ore itself is a peculiar one, being at first sight a common brown clay iron ore, but it is seen on closer inspection to be mixed with minute crystallised grains of the black hematite. It is not magnetic.

No. 2555.

To H. PIDDINGTON, Esq.

Curator to the Museum Economic Geology, Calcutta.

Midnapore, 7th January, 1843.

SIR,—Under instructions from the Military Board, No. 5498, dated 3rd instant, I have the pleasure to forward to you the accompanying Statement and a box, containing specimens of mining products, received from Mr. Babington, Executive Officer on the Raepore Mail Road.

I have the honor to be, Sir,

Your obedient servant,

W. R. FITZGERALD, Major,

Superintending Engineer S. E. Provinces.

Mining Products, from the Kutterbagga Iron Mine, 20 miles North East of Sumbulpore.

1. Specimen of the crude ore, just as found.
 1. A Ditto of rock, or matrix in which found.
 1. B Ditto of earth between the veins.
 1. C Ditto of an inferior ore lying between the veins.
2. The ore after preparation for the furnace.
3. The ore does not contain gravel or stones.
4. No description of fluxes are used.

5. Charcoal used in smelting, made from saul, specimen marked O and from jam, marked X, the English name of the latter wood not known.*

6. The roasted or half smelted ore.

7. The pure metals, as obtained in a merchantable state, in all the qualities, marked D, E and F.

8. Slags of kinds, marked G and H.

9. Earthen model of furnace, and pipe in which bellows are inserted, together with a pair of bellows. The size of the furnace used by the Miners is three feet and six inches deep, by two feet and eight inches wide.

10. Specimens of tools: one large hammer, one small hammer, one pair of pincers; no anvils are used, the iron being beaten out on a large piece of granite.

The mine is situated twenty miles North East of Sumbulpore; there are no traditions as to when it was first discovered, but the Miners say that their families have worked it for ten generations. The gross produce at present is said to be, one thousand maunds Calcutta weight, per annum. Capital and skill are only required to produce an unlimited quantity, as the ore is abundant, and the forests inexhaustible. There is a tax of one rupee and four annas per annum levied on each furnace, paid by the Miners, who all work on their own account, so that it is difficult to form any estimate of their profits as they are cultivators of the soil, and carry on their smelting, when not otherwise engaged. The specimens of iron marked D and E, are sold on the spot for one rupee and two annas per bazar maund, and that marked F, at about eight annas per maund. The health of the Miners does not seem to be affected by their work; they all look well, and many of them attain to the age of seventy or eighty years; they are not subject to any peculiar diseases. With the exception of the cow and buffaloe, they eat almost every description of animal, and drink the mowah spirits to excess; this is their great failing, in all other respects they are not less moral than the other villagers. They do not appear to have any superstitions peculiar to themselves. When a new furnace is erected, and on opening the mine at the commencement of the season, a goat is sacrificed to Gauttailee, the goddess of the mine.

C. L. BABINGTON,

Sumbulpore, 14th December, 1842.

Executive Officer, Raepore Road.

By the permission of the Honourable the President, I have applied to the Government for a set of the Maps of the Atlas of the Grand Trigonometrical Survey for the use of the Museum, and these have been liberally accorded to us; they are now on the Table.

From Captain Goodwyn, B. E. we have received a great addition to our collection in a specimen of the native Asphaltum of Seysell, which is the origin of all the bituminous compounds used under the name of asphalt for road-making and other purposes in Europe. Captain G. informs me, that he has brought out with him about a ton of the prepared Asphaltum for trial in the flooring of rooms. It may be worth noticing here, that the whole lower floor of the Society's House, which was laid in 1839, by Colonel Macleod, with the common mixture of pitch, tar, lime and

* Most probably Engenia *Yamboz*.—H. P.

sand, continues perfectly dry, and even dusty, in the rains, though before it was, with the common pukka floor, most destructively damp. No traces of damp are any where to be seen now.

GEOLOGICAL AND MINERALOGICAL.—We have obtained from the native contractor the two new mineral cases, though, as usual with them, with defects which require to be amended. When I can use them I hope to get on again, and finally, with our mineral arrangements, which now for want of room, it would be almost useless, and next to impossible to do.

We have to acknowledge here from Mr. W. H. Batten, who is most indefatigable in his labours to assist us, the last portion of that part of Captain Herbert's Journal edited by him. He has also kindly offered to give us a memorandum of (unavoidable) Errata in the Extra Number of the Journal, containing Captain Herbert's Reports, and to remark upon a few of his oversights. We have duly received the volume alluded to in his letter, and at my first leisure, I propose looking out the specimens to this part of the Journal.

From our liberal contributor Dr. Spilsbury, and through the kind assistance of Ensign Hickey, 1st Native Regiment, we have to announce the arrival of a magnificent fossil elephant's skull, of which until the matrix is cleared off, we can only say that it is Elephantine; that its width across the temples is about 36 inches; that of our largest recent elephant's skull being only 30.

The Society is specially obliged to Ensign Hickey, for his attention to this precious relic. He found it in the compound of a bungalow at Kamptee, and learning its history, most kindly brought it down to Barrackpore for us.

We have received from Government advice, that the box of minerals alluded to in my last is shipped on the *Prince of Wales*.

H. PIDDINGTON.

1st February, 1843.

The business of the evening having terminated, the Honorable the President then rose, and with much feeling addressed the Members. He stated that it was now upwards of thirty years since he first joined the Society, then under the presidency of Mr. Henry Colebrooke. He was then a young Member of the Civil Service, and little dreamed that he should one day have the honour of filling a chair in which so many illustrious men had sat in succession. He would not advert to the history of the Society in this long period, during which he had been too severely tasked by public duty to do much which he had desired to do, and which, as a well wisher to the interests and objects of this Society he ought to have done, and much which he should have felt pride and pleasure in doing; but it was now his painful duty to state that he had placed in the hands of the Acting Secretary his formal resignation of the Presidentship; which would be duly brought forward at the next meeting by the Committee of Papers.

After so long a connection with the Society, from which he had, he felt, received far higher honours than he had deserved, he could only now, in bidding it farewell, assure every member of it of his continued interest in its labours, of his hearty wishes for its increasing prosperity, and of his sincere desire to forward its interests in every possible way.

Read a memorandum from the Zoological Curator (who from illness had been unable to prepare his report) on some new Monkeys, Birds, &c. on the table.

SIR,—I have to acknowledge the following presentations to the Museum:—

From Captain R. Wroughton, as announced by letter in XI, 879,

A skin of a female Gaour (*Bos Gaurus*), in very good condition;

One of *Crocodylus biporcatus*; and

A large arboreal Wasp's nest.

From J. C. Jerdon, Esq.

A box of various Fossils, from the Neilgherries, a list of which may shortly be expected.

From Mr. Ridsdale, of Bishop's College,

A skin of a Prion Petrel (*Pachyptila Frosteri*).

Three species of Snakes, from Ceylon.

An *Echeneis remora*.

From Mr. DeCruz, of the Botanic Garden,

A most formidable species of true Viper, which I have been unable to find a name for, and wait in this and other instances for the publication of that part of MM. Dumeril and Bibron's valuable '*Histoire des Reptiles*', which treats of the *Ophidia*, before venturing to impose a name upon any species belonging to the order.

A fine *Varanus binotatus*, and some insects.

From Major Ouseley,

A specimen of *Saturnia Assamica*, from Chota Nagpore,

From our Honorary Secretary, Mr. Torrens,

A Rose-crested Cockatoo (*Ptyclotophus rosaceus*.)

Among the numerous specimens obtained in the neighbourhood or purchased, I shall only notice two species of birds; viz.

Hyptiopus (Hodgson, olim *Baza*, H.,) *lophotes*; *Falco lophotes*, Tem. A beautiful pair, male and female, procured alive, and which had the power of erecting their crest quite vertically, as I doubt not is also the case with the various other Hawks similarly crested: and

Vinago? cantillans, Nobis. Male thirteen inches long, by twenty-one inches in alar expanse; wings seven inches; and tail five inches and a half, its form cuneated: bill to frontal feathers seven-eighths of an inch; and tarse three-quarters of an inch. Predominant hue a delicate pearl-grey, conspicuously tinged with ruddy on the crown and breast: fore-part of the wings maroon-red, which also deeply tinges the scapularies and interscapularies: belly faintly tinged with yellowish-green, and a trace of dingy green margining the rump plumage and the smallest tertiaries, also prevailing on the coverts of the secondaries, the greater series of which are slightly bordered with whitish-yellow: primaries and secondaries dusky, together with the extremities of the outer tail-feathers: vent white, the feathers of its sides having dark ashy centres; and lower tail-coverts whitish-buff, being more or less ashy at base. Irides as usual in this genus, or having a crimson ring encircling a violet one: bill and bare skin around the eye glaucous-blue; and legs and toes reddish caraneous. This remarkable species is essentially a *Vinago*, though differing considerably from the typical species in the form of its bill and feet; insomuch that it might, with propriety, be elevated to

the rank of a particular subgenus: the former is comparatively slender and elongated, having the basal three-fifths membranous and tumid, and the corneous extremity feeble; and the toes also are slender, and not broadened underneath. The specimen described was purchased alive, and was said to have been brought from Agra; but some *shikarees* to whom I shewed it decidedly recognised the species, at once remarking on the peculiarity of its note, and said that it is procurable in the Soonderbuns. Its *coo* is extremely remarkable, bearing no slight resemblance to the human voice in singing, and highly musical in tone; it is considerably prolonged in different cadences, and terminates very abruptly; but every time it is repeated exactly as before, so that it becomes wearisome, at least to an European ear*. This bird was sold to me as the *Kokla* Pigeon of the Upper Provinces, great numbers of which are kept in cages by the natives, for the sake of their music; but enquiry has led me to ascertain that *V. sphenura* is the true *Kokla* of the Upper Provinces, whereas in Bengal this term is applied to *V. bicincta*, Jerdon, both of these species differing from the common Hurrial (*V. militaris*) by having coral-red legs instead of gamboge-yellow ones, which is generally mentioned as the distinctive feature of the *Kokla*; the *V. bicincta*, however, has a less musical, or at least less varied, note than the Hurrial. The *coo* of the latter, if such it can be called, consists of a melodious deep toned whistling note, varied by a guttural sound; and those who are unacquainted with it would be apt to mistake it for the note of a true singing bird: that of *V. bicincta* is equally melodious, but less prolonged as well as less varied. I know of only the two last-named species of this genus in the vicinity of Calcutta.†

With much respect, I remain, Sir,

Yours obediently,

EDWARD BLYTH.

P.S.—As the foregoing Report is very brief, I shall take this opportunity to revise my previous Reports to the Society, commencing with Vol. X, p. 836.

Page 837. *Orang-utans*. Important information on these animals has been communicated by Mr. James Brooke, respecting those of Borneo, in a letter to the Curator of the Zoological Society, published in the 'Proceedings' of that body for July 13th, 1841. That gentleman has satisfactorily confirmed the deductions of Mr. Owen from certain crania, to the effect that at least two, and there is every reason to suppose three, distinct species exist, all of which inhabit the island of Borneo.

One, the *Mias Kassar*, or *Pithecus Morio* of Owen, is distinguished by its inferior size, by the non-gigantic proportions of its extremities, by the absence of callosities on the cheeks at all ages and in both sexes, by the small size of its teeth, and especially by having no elevated ridge whatever extending backward beyond the frontal bones of the skull. The nearly perfect skeleton of a female Orang in the Society's Museum appertains to this species.

* It scarcely differs, if at all, from the note of *V. sphenura*, which I have since heard.

† In a letter just received from Mr. Jerdon, that naturalist enquires whether I have ever obtained the grey-bellied *Vinago*, figured as *militaris* by Gould? Certainly, Gould's species is the common Hurrial of Bengal; but I have also obtained one female which I now think is distinct, being probably the *V. militaris* apud Jerdon. This bird has the whole under-parts bright green, but not any of this colour on the basal part of its caudal *rectrices*, and there is also scarcely a trace of red on its lower tail-coverts. Size rather inferior to that of the other. It may bear the specific name of *chlorigaster*.

Another, the huge animal with immense cheek-callosities and gigantic extremities, has the ridges of the skull less elevated than in the next kind, "but the size of the adult skulls is equal;" in this "the ridges rising from the frontal bones do not meet, but converge towards the top of the head, and again diverge towards the posterior portion of the skull." Unfortunately, we have not the cranium of Dr. Abel's Sumatran specimen, the skin of which, as I stated in my former Report, *possesses cheek-callosities* of moderate size; but the skin of the head is mutilated so that it cannot be ascertained whether the frontal ridges meet or not on the vertex, although they are strongly marked on the skin so far as this is perfect. The whole top of the head from the forehead has, in fact, been cut away; and all that we possess of the osteology of this specimen is the lower jaw, which presents a very decided difference of form from the lower jaws of both the others. There appears to be no reason, however, for doubting that this Sumatran animal is perfectly identical with the Bornean *Mias Pappan* of Brooke, or *Pithecus Wurmbii* of Owen; and accordingly the *Pithecus Abelii* (verus) must be reduced to a synonym.

In a third form of skull, "the two ridges, one rising from each frontal bone, join on the top of the head, forming an elevated crest, which runs backward to the cerebral portion of the skull." This Mr. Brooke presumes to be the *Mias Rambii*, a third species distinguished by some of the natives of Borneo, and stated by them "to be as tall as the *Pappan*, or even taller, but not so stout, with longer hair, a smaller face, and no callosities either on the male or female; and they always insisted that it was not the female of the *Pappan*," which is asserted by them to have cheek-callosities, the same as the male. The probability of this being a distinct species is further strengthened by a large adult living female shipped by Mr. Brooke for England; "her colour is dark brown, with black face and hands; and in colour of hair, *contour* and expression, she differs from the male Orangs, with the callosities, to a degree that makes me doubt," writes Mr. Brooke, "her being the female of the same species." A skull of a Bornean specimen according with this description exists in our Museum, being clearly identical in kind with that (also from Borneo) figured in the Zoological Society's 'Transactions,' II, plates XXXI and XXXII; but it is evidently that of a female from its smaller size, the inferior development of the ridges, and the size of the canines.

In the first Volume of the same work, Professor Owen has described and given two figures of an *alleged* Sumatran Orang's skull, which differs again in certain particulars from the large Bornean specimen figured by him as adverted to. The profile of the face, if I remember rightly, is much more concave; but our library is unfortunately deficient in that *part* of the volume, and I have been unable to get it elsewhere in Calcutta. However, in describing the Bornean specimen, Mr. Owen writes (in Vol. II, p. 168), that — "The osteological differences relating to the structure and contour of the cranium, [in the Bornean and presumed Sumatran specimens,] have been described in my previous communication on the subject, and I now subjoin figures, of the natural size, of the cranium of an adult male, undoubtedly from Borneo (pl. XXXI and XXXII), a comparison of which with the figure of the (said to be Sumatran) Orang's skull (pl. LIII and LIV, Vol. I, *Trans. Zool. Soc.*), will convey an adequate idea of the osteological difference alluded to." Both have the ridges

united along the vertex, as in the last described form mentioned by Mr. Brooke, so that a fourth species of Orang may yet remain to be discovered.

According to M. Isidore St. Hilaire, in the *Zoologie du Voyage de M. Bélanger*, p. 25, Orangs are found in Cochin-China, and the Malay peninsula, as well as in Borneo. He does not mention Sumatra, though quoting Clarke Abel's account, and was unaware of the existence of a plurality of species.

There is now living in Calcutta a young male Orang having incipient cheek-callosities, which consist of merely a thickened fold of skin, which would certainly not be observed unless attention were especially directed to the subject. He has as yet cut none of his *true* molars, and measures sixteen inches from shoulder to ham, and twenty inches from shoulder to tip of longest finger. His gait is decidedly not that of the *Kassar*, as described by Mr. Brooke, nor does that gentleman's account of that of the *Pappan* well apply to it; this animal going on all fours, and (what of course must be considered an individual peculiarity,) I observe that he invariably walkswith one fist closed, bearing however on the wrist, and the other having only the fingers doubled; both hands being turned outward. So far as can be judged from so young an animal, I am inclined to think that the ridges arising from his frontal bones *will meet*; but I would not lay much stress upon this observation: and the only further remark that I need at present make concerning him, is that his posterior thumbs are nail-less, as is most usual.

Page 838. *Gibbons. Hylobates leucogenys*, Ogilby. With reference to my incidental remarks on the habitat of this species, Mr. Jerdon writes me word — “You may rely upon it no real Ape exists in Southern India.” Lieut. Beagin's statements were, nevertheless, positive; and he could not well have confounded it with *Semnopithecus Johnii*, as he also favoured me with information concerning that species (vide *Proc. Zool. Soc.*, 1841, p. 60). An undetermined species of Gibbon inhabits Celebes.

Page 839. *Indian Semnotes*. Only two species of the extensive Austral-Asian genus *Semnopithecus* are recognised as inhabitants of Continental India in the most recent work of authority treating on the subject, which is Mr. Martin's ‘Natural History of the Mammalia,’ unfortunately discontinued (from the failure of the publishers, in 1840,) after the ninth number, which contains an account of the group under consideration. The two species adverted to are:— *S. Entellus*, the common *Hoonuman* of Bengal, understood to be very generally diffused, and not only in the low country, but occasionally ascending even to the verge of the snow-line upon the Himalaya, — and *S. Johnii* (Fischer, vel *cucullatus* of Is. Geoffroy and Lesson), which is confined to the southern parts of the country, “abounding,” as Mr. Jerdon informs me, “in the dense woods of the Neilgherries, and in the *forest* on the *sides* of the hills. I have also seen it,” he adds, “in the elevated district of the Wynaad, but only near the base of the Neilgherries. It associates as usual in small herds; leaps with amazing agility, and has a loud call very like that of the *Entellus*. The young are perfectly black, with hardly an indication of the light-coloured hair of the hood of the adult. It is more suspicious and wary than the *Entellus*, and never leaves the woods.”

The *S. cephalopterus* (vel *latibarbatu*s, *leucoprymnos*, *falvogriseus*, et *Nestor*, Auctorum,) is, however, described as peculiar (so far as known) to Ceylon; and in the description of *S. Johnii*, Mr. Martin observes that — “In the Paris Museum a

specimen exists, which is here referred, though with some degree of doubt, to the *S. Johnii*; as it differs considerably in the general tone of its colouring, from any of the examples of this species hitherto examined. It is an aged female from Malabar, and is accompanied by its nursling, considered to be her own offspring." The following description is annexed: — "Length of head and body two feet; of tail three feet two inches. The fur resembles that of an adult *Entellus*: the back is of a fuliginous-grey, becoming darker on the shoulders and thighs, and still more so on the arms and legs, where the colour is nearly black; the hands and feet being quite black: the head, whiskers, and beard, which latter is conspicuous, are of a dirty straw-yellow, passing insensibly into the hue of the back; the long eye-brows, and hairs continued from them over the sides of the cheeks, are black, as are also those scattered on the upper lip; the face is black; the tail dark brown, its apical third being much paler; the inside of the humerus, and of the thighs and the under surface of the body, are of a dusky straw-colour. The nursling is covered with close, soft, soot-coloured hairs."

This description closely applies to the fully adult male which I named *S. hypoleucos* in my first Report to the Society, except that the size is larger, and the tail of the Society's specimen is wholly black*: the dirty-whitish hue of the crown, also, is distinctly enough separated from the peculiar colour of the back, which Mr. Martin styles a fuliginous-grey, while in my description I have termed it "a rather deep and somewhat dusky brown, with a tinge of chocolate"; but the truth is, it is by no means an easy tint to express in words, being nearly the same as, but darker than, the duskyish *chocolat-au-lait* tinge more or less developed along the croup of *S. Entellus*, being moreover darkest between the shoulders and upon the middle of the back, and paling considerably on the sides of the back and towards the rump: the Society's specimen is also probably of a less deeply sullied white underneath than that described by the author quoted, though sufficiently tinged with straw-yellow to render the specific appellation which I have bestowed on it not particularly appropriate.

Feeling no doubt, accordingly, that the Society's specimen is identical in species with that in the Paris Museum, the more especially as the latter was received from Malabar, whilst at Madras I learned that the Society's animal was there known as the Travancore Monkey, I cannot but express surprize that so experienced a student of Mammalia as my friend Mr. Martin is, should have hesitated at all about recognising this as a distinct species from the *S. Johnii*, from which (independently of colour) it conspicuously differs in having the hair of the whiskers and back of the head not remarkably lengthened, and in having the same radiating centre on the forehead as the *S. Entellus*; the crown is, however, more densely clad, and with longer hair, than in the *Entellus*, which is not similarly appressed; but, in general characters, this species closely approximates the *Entellus*, much more than it does the *Johnii*, and with the next would appear to form with it a slight minimum subdivision of the genus, apparently peculiar to Continental India.

Of its habits, Mr. Jerdon writes me word, "The black-armed species is peculiar to the dense forest of the Western Coast. It abounds at the base of the Neilgherries in Malabar, Travancore, &c., lives in small troops, and has the usual loud cry of the others of this genus. The true *Entellus*, I have found chiefly in the neighbourhood of

* The colour of the tail varies much in *S. Entellus*.

large towns, frequenting *groves*; also however in forest in Goomsoor, and open jungle in the Deccan. It is a much larger kind than the other."

Mr. Hodgson, in *J. A. S.* IX, 1212, has described the *Lungoor* of Nepâl as a particular species, by the specific designation *schistaceus*: it would certainly appear, from his description, to be distinct from the Bengal Hoonuman, both exceeding it in size, and differing from any of its varieties observed by me, in colour; and as the description furnished by that naturalist is brief, I shall here republish it, and then remark wherein it would appear to differ from the *Entellus*.

"Habit of *Maurus*: dark slaty above, below and the entire head, pale yellow; mere hands and feet somewhat darkened or concolorous with the body above; a pencil of black hairs radiating upwards from the brows, concolorous; tail longer than the body, more or less tufted; skin black, nude on face, and on last phalanges of anterior digits; hair on the crown short and radiated, on the cheeks long, directed back, and hiding the ears; piles or fur of one sort, not harsh, nor soft, more or less wavy, three to five inches and a half long on the body, closer and shorter on the tapered tail: thirty inches long; tail without the hair thirty-six; hand six and a half; foot eight and a half. Females smaller, with shorter canines. Habitat, the Tarâf forest and lower hills [of Nepâl], rarely the Kachâr also."

Of the *Entellus* of the Southern Mahratta country, Mr. Elliot states, "An adult male measured, from muzzle to insertion of tail, one foot ten inches and a half; length of tail alone three feet two inches and a half; height from heel to crown three feet two inches and a half; weight twenty-two lbs.: ditto of an adult female eighteen lbs." Mr. Martin gives the admeasurements of the adult male, as two feet two inches from head to root of tail, the latter with hair three feet one inch. In an excursion which I made for the express purpose of observing and collecting some specimens of the Hoonuman of Lower Bengal, I procured a fine adult, but not old, male, and a much older, though still not past offspring-bearing, female, besides younger individuals; and I have since obtained other adults. The male measured twenty-four inches from crown to base of tail, the latter without hair thirty-eight inches, being mutilated of its extremity: the corresponding dimensions of the female were twenty-two inches and thirty-nine inches, the slight tuft at the end of the tail reaching to four inches more: hand of the male five inches and three-quarters (or measuring to the extremity of the naked space inside the wrist, nearly six inches and a half); of the female five inches and a half: foot of the male eight inches and a quarter, and of the female seven inches and five-eighths. These admeasurements were taken from the recent animals. The male here noticed has its permanent series of teeth complete, but quite unworn; whereas the female has its grinders worn down almost to the gums, and its canines to a level with the incisors, shewing a transverse section of their structure: how the latter should be thus worn away remains to be ascertained. The male was killed in the act of feeding on the pods of a common species of *Dolichos*, and the same appeared to constitute the contents of the stomachs of the others shot on the same occasion, so far as could be made out, and especially from the pale green colour of the thoroughly well masticated mass. This was at the end of January, and one I killed towards the close of July had been feeding on some kind of foliage, thus verifying the suggestion of Prof. Owen regarding the natural diet of this genus of Monkeys.

The female specimen here noticed is the darkest-coloured individual of *S. Entellus* I have ever seen, while the male is nearly identical in colour with the young (which do not appear to vary, at least more than in a very trifling degree); but his hands and feet are *wholly deep black*, as are likewise those of the female (the feet of the latter having some pale hairs intermixed), and as has equally been the case with all the adults I have noticed: whereas this black is much less strongly marked in the young, but is constantly present in different stages of development. Now Mr. Hodgson's *schistaceus* is stated by him to have the mere hands and feet *somewhat darkened, or concolorous with the body above;*" and the hue of the upper-parts is described to be "dark slaty," a term which could never have been applied even to the remarkably deep-coloured female *Entellus* now before me. On the other hand, this black does not in the least ascend the limbs of the latter specimen, wherein it conspicuously differs from *S. hypoleucos*. The hair on the cheeks of *schistaceus* is described to be "long, directed back, and hiding the ears," which last is certainly not the case in *Entellus*; and that of the body is mentioned to be "three to five and a half inches long," though it is possible that the word *five* has been here printed for the figure 3, in which case there would be no difference in this respect. The diversities indicated, however, are quite sufficient to warrant our pausing, for further evidence, before following authors in identifying the *Lungoor* of the Himalaya with the *Hoonuman* of the plains (at all events of Bengal), and the current statements, therefore, regarding the geographic range of the latter must, for the present, remain in abeyance.*

Should the *Lungoor* prove distinct, no less than five species would accordingly represent this genus in the *Fauna Indica*: viz. *schistaceus* on the Himalaya, though, by the way, Mr. Hodgson describes this animal to frequent "the Tarai forest and lower hills, rarely the Kachâr also," of Nepâl, and it may be presumed that the Bootan species, and the alleged *Entellus* Monkey of other elevated regions of the Himalaya, will prove identical;—*Entellus* in Bengal, being probably that of the Indian peninsula generally;—*hypoleucos* and *Johnii* in the hilly regions of the South;— and *cephalopterus* in Ceylon.†

To resume my notice of the true *Entellus*, I observe that Mr. Martin asserts that—"In young individuals, the hands and feet are washed with dusky-black, *but this,*" he adds, "*is not always the case in adults*, which have a paler colouring altogether than the young, often verging upon dingy-white, tinged with straw-colour." This is opposed to what I have observed of those of Lower Bengal. Considerable numbers of

* Mr. Fraser, in his "Notes on the hills at the foot of the Himala mountains" (Journal of Tour in do., p. 350), mentions "a long-tailed Ape of a *dark brown* colour, and considerable size," as common. The expression *dark brown* will certainly not apply to the Bengal Hoonuman. I have shewn our specimens of the latter to several gentlemen familiar with the *Lungoor* of the Himalaya, and the usual impression was, that they are different; but Dr. Falconer (a host in himself) is reluctant to consider them as distinct, although he, in common with most others, remarked at once the blackness of the hands and feet, as one difference from the *Lungoor*.

† A sort of *out-burst* of new species of mammalia, described or semi-described by Mr. J. E. Gray, of the British Museum, in the 'Annals and Magazine of Natural History' for December, 1842, has just reached me, wherein is assigned to *India* (Qy. Hindoostan?) a *Presbytis nobilis* (this very trivial subdivision being merged in *Semnopithecus* by most authors). It is described as "bright rufous, without any streak on the shoulders.—This species differs from the *Simia melalophos* of Raffles in being darker, and not having a black crest; from *P. flavimanus* in being of a nearly uniform auburn, and not yellow, with a blackish back, and in having no black streak across the shoulders or on the cheek." p. 256.

the young may often be seen together in the shops of the Calcutta dealers, being all of one size and colour at any given time, and when about a quarter grown they may be described as having the head (except where naked), and the under-parts generally, much paler than the back, the hue of which is best expressed by the term — a light dingy isabella-colour; tail somewhat darker, its terminal third pale in some, while others have the whole tail pale; limbs slightly washed with greyish chiefly below the elbow and knee, and the fore-arm somewhat darker; the hands and feet nigrescent, more developed on the former than on the latter. The palest *adult* male that I have met with only differs in having these colours more distinctly brought out, and consequently contrasting, the entire hands and feet being conspicuously deep black, and a large lengthened space on the croup (scarcely traceable in the small young), being of a light chocolate-brown differing from the rest. A nearly half-grown young specimen has the shoulders, sides, humeri, and greater part of the thighs, of the same very pale colour as the head, and the moderately dark croup-patch well developed and strongly contrasting: another of the same size merely differs in having the croup-patch less defined, and spreading faintly over the shoulders and humeri; the blackish on the hands and feet increasing in intensity. Finally, the dark female (which, it may again be noticed, is much older than the male, having her teeth worn down to stumps, whereas those of the male already described, as also those of another male nearly as dark as the female, are quite entire, though I nevertheless have reason to suspect that these animals become darker with age,) has merely the colours generally much darkened, the hue of the croup spreading, but less deeply than on that part, over nearly the whole upper (or rather hinder) parts, being nearly identical with that of the fore-arm and leg, which are in part as dark as the croup itself; tail still darker for three-quarters of its length, but then paling to the tip; and the hair of the under-parts below the nipples deeply and very conspicuously tinged with orange-brown; hands and feet black (*i. e.* the hair of their upper surface as well as the palms and soles), as described. The visage of the male is much larger, with the muzzle more protruding, than in the other sex; the pair having a strongly characterized masculine and feminine expression.

From a passage in Moor's *Hindu Pantheon* (p. 320), it would seem that the Hoonuman has not unfrequently twin offspring; that author mentioning their scampering over the fields and hedges, when put to rout by the appearance of a stranger, "some with a young one under the arm, and a second clinging to the neck. The most numerous hordes of Monkeys," he continues, "that I ever saw were on the banks of the Jyghur river, between Bombay and Goa. In Guzerat, Apes [Monkeys] abound." The Hoonuman always descends from the trees upon alarm, at least where the ground is sufficiently open for them to make their way upon it (and I doubt whether they are elsewhere met with), and it should perhaps be added when no four-footed enemy awaits them there, from the pursuit of which they are secure above. The Tiger is known to make a frequent prey of them, and I imagine more commonly pounces on them when on the ground, than avails himself of the stratagem mentioned by Dr. Fryer and Mr. Forbes.* Upon the approach of a human stranger, in European dress, they certainly always trust to their speed on the ground for security, and it is a beautiful sight to observe them fast scampering away, with the tail raised

* *Vide* Forbes's 'Oriental Memoirs.'

to curve over the back; they seek to hide themselves in thick bushes, or more commonly upon trees which have sufficiently dense foliage for the purpose, but which are not too thick for them to observe what is going forward around; the bamboo and the tamarind tree are thus particularly selected, but not the mango which is too dense; and when a quick eye has discerned one couched within the foliage, or peering from behind a fork of the timber, of perhaps some isolated tree, away it will suddenly rush in the finest imaginable style to the ground through the branches, and make off with a rapidity which few marksmen could depend on checking. There are not many places, however, as is well known, where the Hoonuman can be shot at with impunity; but I know of one within a moderate distance of Calcutta, where the natives render every aid to the gunner who will help to rid them of these troublesome neighbours: another tide up the river, and we arrive at Gouptipara,* the scene of M. Duvaucel's anecdote of one these Monkeys; and there, as in his time, the Hoonumans are strictly protected. That accomplished naturalist remarks that the appearance of this species in Lower Bengal takes place principally towards the latter end of winter; upon which Mr. Martin notes, that it appears to migrate from the upper to the lower provinces of this part of India. I can only state that I have found them equally numerous in July and January in the particular locality adverted to, and that I have seen them in June close to Calcutta on the opposite side of the river. With respect to the alleged migration of the Himalaya species (?), also, Capt. Hutton mentions, that—"This species is found at Simla all the year through, but when the snow falls during the winter it seeks a warmer climate, in the depth of the *Khads*, returning again to the heights as it melts away. I have seen them, however, on a fine sunshiny day even with the snow on the ground, leaping from tree to tree up and down the hill of *Jakú* at Simla, which is 8115 feet. Royle," continues this observer, "is mistaken when he says, that the *Entellus* alone ascends in the summer months as high as 9000 feet! I have seen them at *Ndgkunda* in August at 9000 feet, and in winter on *Hdtú* mountain which is 10,655 feet; and in winter at Simla with snow four or five inches deep, and hard frosts at night, as high as 8000 feet." The *Macacus Rhesus*, also, was seen by this observer "repeatedly during the month of February when the snow was five or six inches deep at Simla, roosting(?) in the trees at night, on the side of *Jakú*, and apparently regardless of the cold." *J. A. S.* VI, 934-5.

I know of one locality where the whole numerous community of Bengal Hoonumans appears to consist of males only, of different ages from half grown or less to adults; and the natives of that part say that furious battles are frequent among them: whereas the great majority are females in the other locality that has been spoken of, and it is understood that each male attached to a flock of females allows no other male, even half-grown, to approach them. Though a stream navigable for boats passes through the jungle inhabited by the latter community, or probably series of communities, with plenty of Hoonumans on each side of it, the natives of the place informed me that they had never known one to pass across, or in fact to enter the water.

S. pileatus, *Nobis. n. s. ? Cercopithecus albocinereus ?*, Desmarest. A particularly handsome (half-grown) specimen of an animal of this genus has been received by the Society from Barrackpore, stated to be Malayan, but which I cannot identify with

* Not *Goalpara*, as Mr. Ogilby surmises; but *Gouptipara*, as Mr. Duvaucel spelt it, and as it is also spelt in the maps, — a place on the right bank of the Hoogly, opposite Santipore.

any of those described by Mr. Martin. It most nearly accords with M. Desmarest's description of his *Cercopithecus albocinereus*, as rendered by Mr. Martin in his account of *S. comatus*; one exception being, that the ears of the latter are stated to be "large, naked, angular, and black," whereas in the specimen before me they are proportionally smaller than in the *Entellus*, and their duplicature above is well clad with whitish hairs. The general aspect of this animal recalls to mind that of a Lemur: having the fur softer, longer, and more dense than in the *Entellus*, and the tail well clad and distinctly tufted at its extremity; there is no radiating centre, nor vertically raised crest, upon the head, and the fur of the occiput is rather short (wherein it decidedly differs from *S. obscurus*); but the usual superciliary black hairs are of considerable length, and behind these the fur of the forehead is rather short and directed backward, being mingled with longer black hairs on the sinciput directed laterally, while those of the crown also are a little lengthened and stand out behind, overhanging the occiput, thus imparting somewhat the appearance of a small flat cap laid upon the top of the head; there are also a few scanty fine black hairs on the sides of the face and of the upper lip. General colour a delicate soft grey, rather darker on the upper part of the back, and slightly inclining to albescent on the arm, fore-arm, and leg; tail a little sullied with yellowish brown, and darker towards its extremity, which is of a dusky-brownish hue: sides of the crown blackish, chiefly from the intermixture of the laterally disposed fine black hairs already mentioned; the forehead somewhat pale; face black as usual; the hair of the cheeks whitish and strongly contrasting, being considerably lengthened laterally and posteriorly, so as to hide the lower part of the ear, behind which is also some similar long and glistening whitish hair continued from beneath; scanty beard also whitish; and the whole of the lower parts and inside of the limbs dull fulvous-white: the hands have a slight blackish stain, except on the penultimate phalanges of the digits, and the feet have a similar stain on the first or basal phalanges only; hence the adult animal would perhaps have the hands and feet black, as in the true *Entellus*, or partly so. The specimen described is a female; and, should it prove new, the species might be appropriately termed *S. pileatus*. I may add, that the skin is everywhere of a light colour, except on the naked parts. The dimensions of the recent animal were—from vertex to tail eighteen inches, the tail twenty-eight inches and a half, or with its terminal tuft thirty-one inches; length of humerus six inches, of fore-arm the same, and of hand four inches and a quarter; femur seven inches and a half, tibia seven and three quarters, and foot from heel six inches and a quarter. Irides rather pale brown.

I strongly incline to suspect that this handsome Monkey is of the species termed *albocinereus* by M. Desmarest, of which he states that it is "a new species (not figured), from the collection preserved in the [Paris] Museum, and brought by M. M. Diard and Duvaucel. Country, the Island of Sumatra." M. Isidore St. Hilaire, however, according to Mr. Martin, states that "no such animal was ever brought from India [the East] by M. M. Diard and Duvaucel, answering to Desmarest's description, nor does any specimen agreeing with it, exist in the Museum of Paris. During the author's [Mr. Martin's] recent visit to Paris, he examined, separately, every Monkey in the Museum, and, certainly, could discover no species to which the description could be said to be fairly applicable. Moreover, every specimen brought from Java or Sumatra, and obtained there by M. M. Diard and Duvaucel, is well

known, and the species are not to be mistaken." There is accordingly no means of determining, with certainty, whether the animal here described is identical in species with that of *M. Desmarest*, but the probability is certainly in favour of the identification.

At present, we are really quite ignorant of what species of Monkeys inhabit the countries bordering on the Bay of Bengal to the eastward. The *Semnopithecus obscurus* (Reid, *P. Z. S.* 1837, p. 14,) has recently been discovered by Mr. Cuming to be very common at Singapore, "varying greatly in the depth of its colouring, no two specimens being precisely the same. The general hue ranges from greyish-black, or smoke-grey, to black; the [lengthened] occipital crest and the tail being always paler than the rest." And as the *Hylobates Lar*, previously known only as an inhabitant of the Malay peninsula, has been received by this Society from Moulmain, where it is most probably the common species of the interior adverted to by Helfer, it is likely that *Semnopithecus obscurus* extends its range similarly northward, and that it is the *maurus* of Dr. Helfer's list, mentioned as "a very wild inhabitant of the loftiest trees, and considered the best food by the Kareans, who shoot it with poisoned arrows." The true *maurus* appears to be confined to Java, being replaced in Sumatra by *femorialis*—the doubtfully cited *maurus* of Sir Stamford Raffles.

P. 840. Returning now to my first Report, in the page cited I have mentioned specimens of *Pteropus Edwardsii* vel *medius* from the vicinity of Madras and from Travancore, the latter with a note of doubt which may now be cancelled, as I have obtained the same variety of colour here, as well as intermediate specimens; and Mr. Hodgson has also forwarded specimens of his *Pteropus leucocephalus* and *Pt. pyrivorus* from Nepâl (vide *J. A. S.* IV. 700), the former being (as already asserted by Mr. Ogilby) perfectly identical with *Edwardsii*, and the latter is *Pachysoma marginatum*, also common here. A third species of Indian frugivorous Bat, the *Pt. Dussumieri*, Is. Geoff. (*Zoologie du Voyage de M. Bélanger*, p. 89), is still wanting to our collection. Length about eight inches, and extent nearly two feet and a half. Face and throat brown; the back and belly covered with brown hairs having some whitish ones intermixed; the upper part of the breast russet-brown; and sides of the neck, from the ears to the insertion of the wings, fulvous with a shade of russet. Specimens of this Bat were obtained "on the Continent of India" by M. Dussumier, and recently by Dr. Royle near Saharunpore. The *Pt. Javanicus* occurs in the Tenasserim provinces, and a new species has been described by Dr. McClelland from Assam, as *Pt. Assamensis*, *P. Z. S.* 1839, p. 148.

Taphozous. For descriptions of four Indian species of this genus of Bats, vide X, 971, and XI, 784.

The Reptile cited as *Varanus binotatus* is my *V. Bibroni*, XI, 869.

P. 841. *Hæmatornis pusillus*, Nobis, or *Ixos pusillus*. This distinct species appears to fill the place, in the peninsula of India, of *I. Cafer* of Bengal and Nepâl, which latter was unknown to Mr. Jerdon who so designated the other. It also inhabits Arracan.

P. 922. The two races of *Buceros ruficollis* noticed, as inhabiting the Tenasserim provinces, have proved to be distinct species; of which the true *B. ruficollis*, Vieillot, is distinguished by its superior size, the flatness of its casque, and the lateral transverse ridges on the basal portion of the bill itself; these last being constantly wanting in the other, which has likewise the casque much more elevate or convex. In my Report to Government on a collection of Tenasserim specimens forwarded by the late Dr.

Helper, I have designated the latter species of Hornbill — *B. subruficollis*: the two present no difference in plumage.

B. leucogaster, Nobis, is identical with *B. albirostris*, Shaw, erroneously identified by Mr. Jerdon with *B. Malabaricus*, which is *B. monoceros*, Shaw. The latter appears to be restricted to Hindoostan and Ceylon, being replaced in Bengal, Assam, and the Tenasserim provinces, by the present nearly allied species, which differs in being smaller, in having the casque much less compressed, the black mark on this being also differently placed, and especially in the colouring of the tail, *B. Malabaricus* having the three exterior *rectrices* wholly white, and the next chiefly so, while in *B. albirostris* they are only tipped with white. The specimen of the latter described as *B. leucogaster*, was immature.

P. 923. The *Oxylophus* described is *O. Coromandus*.

Phœnicophæus longicaudatus, Nobis, is the *Melias tristis* of Lesson; whilst my *Ph. tristis* described in the Monograph of Cuckoos (XI, 928), would appear to be his *M. Diardi*, a specific name, however, which yields precedence to *Sumatranus* of Raffles. These and other emendations and additions to my paper on *Cuculidæ* have been put together as an appendix to that Monograph, which is awaiting publication.

P. 924. *Ianthocincla leucolophos*? *var.*, is the *Garrulax Belangeri* of Lesson.

Muscipeta Indica vel *castanea* becomes, with full maturity, *M. paradisea*; vide XI, 884.

P. 925. *Ciconia nudifrons*, Jerdon, should be *C. nudifrons*, McClelland, and *C. calva*, Jerdon; *C. immigratoria*, Hodgson; and I much suspect *C. Javanica*, Horsfield, vel *C. capillata*, Temminck. It is common about Calcutta, where the only additional species of 'Adjutant' is the great *C. argala*: besides these, there are the *C. nudifrons*, Jerdon (not of McClelland), in the Indian peninsula, and the *C. cristata*, McClelland, in Assam; also, in the latter country, I am told that there is an 'Adjutant' with a black breast.

3/ P. 917. For *Anthus rufescens*? read *A. agilis*; and for *Motacilla alba*, *M. leucopsis*, Gould, vel *alboides*, Hodgson, — long ago figured by Sonnerat.

Tadorna Bellonii. Not very uncommon.

Vol. XI, p. 95. I may here anticipate the publication of my paper on Indian Moles (*Talpa*), which is awaiting the arrival of some Assamese specimens for examination and comparison, by mentioning that the Sylhet species is very different from those of Nepâl and Darjeling, which latter differ, the Nepâlese (*T. micrura*, Hodgson,) in having a short but very distinct tail, whilst the latter (*T. cryptura*, Nobis,) has only the merest rudiment of this appendage, as shewn by two specimens of this last in the Society's Museum, one of them being in spirits. The Assamese species appears to be at least allied, if not identical, with that of Sylhet.*

P. 98. The species of Weasel noticed by the provisional name *humeralis*, I have since been induced to suspect is identical with *Putorius Subhemachelanus*, Hodgson, *J. A. S.* VI, 564, as already mentioned in a note to XI, 280.

* I have just received a letter from Major Jenkins, Political Agent in Assam, announcing that he has forwarded a specimen of the Assamese Mole in spirits, in obliging compliance with my request of him.—This has since arrived, and appears (so far as can be judged from its external characters) be identical with *T. micrura* of Nepâl; so that there are two distinct species of this genus in Assam.

P. 100. When tracing the geographic range of the common Jungle Cat of Bengal (*Felis chaus*), I strangely did not think of referring to Mr. Elliot's valuable list of the species of Mammalia inhabiting the Southern Mahratta country (*Madr. Jl.*, No. XXIV, p. 108), or I should have been there informed of its occurrence in Southern India. The *F. viverrinus* has lately been obtained by me in the vicinity of Calcutta.

P. 102. To the species of oriental Hare adverted to, add the Tibetan *Lepus pallipes*, Hodgson, p. 288 seq., and the Tartarian *L. tolai*, Pallas. *L. ruficaudatus* is stated, in the *Zoologie du Voyage de M. Bélanger* (p. 157), to have been "discovered in Bengal by M. Duvaucel. It likewise exists in the neighbourhood of Pondicherry," continues M. Isidore St. Hilaire, "and in various other parts of India. Lastly, it has more recently been met with in the Isle of France, by M. M. Quoy and Gaymard." This Society has lately received the other Indian species (*L. nigricollis*) from the Isle of France, and this alone is mentioned to exist there in M. J. Desjardins' list of the mammalia of that island, in *Proc. Zool. Soc.* for 1831, p. 46.* The European *L. timidus* is mentioned, in addition to *L. ruficaudatus* and *L.* (vel potiús *Arctomys?*) *hispidus*, in Dr. Walker's catalogue of the mammalia of Assam, published in McClelland's Journal, No. X, p. 367: but should this introduction of it repose solely on the authority of the notice referred to this species in *Proc. Zool. Soc.* for 1839, p. 152, then I think we might infer that it may be safely withdrawn from the list of Assamese mammalia, as there can be little doubt of that notice referring to *L. ruficaudatus*. In a catalogue which I have received of a collection of British specimens, for the Society's Museum, which are now on their voyage to this country and may shortly be expected, it appears that examples have been sent of the four species of *Lepus* found in the British islands, which will afford the means of comparing Assamese specimens of reputed *L. timidus* with the animal of Europe.

P. 105. *Picus sultaneus*, Hodgson; vide p. 970: in reference to which Mr. Jerdon suggests, with much probability, that Dr. Horsfield's alleged female of *P. strictus* must have been a young male of that species.

P. 106. To the list of Indian species referred to Mr. Hodgson's genus *Chaitaris*, add the *Muscicapa banyumas*, Horsfield (vel *M. hyacintha*, Tem. apud Tickell, *J. A. S.* II, 574), which is closely allied to *Ch. rubeculoides* — the *Phœnicura rubeculoides*, Vigors and Gould. Mr. Hodgson has also forwarded to the Society a *Ch. auricularis*, a figure of which occurs among Dr. McClelland's drawings of Assamese birds. *M. cantatrix*, Temminck, is identified by Dr. Horsfield and others with *M. banyumas*; and the *M. rubecula*, Swainson, apud Jerdon (*Supplement*), is now suspected by that naturalist to be merely the female or young male of *banyumas*, "so that the label in the French Museum, as quoted by Swainson, may not be so erroneous as he imagines." The *Muscicapa aurea*, Auct., would also appear to be no other than *banyumas*.†

* I fancy there must be some misconception here, on the Part of M. Is. Geoffroy. The Pondicherry species (*nigricollis*) inhabits the Mauritius, having doubtless been introduced there; but I much doubt whether the other (or *ruficaudatus*) occurs in Southern India at all. The "Indian Hare" may have been brought by M. M. Quoy and Gaymard from the Isle of France, being the Pondicherry species — *L. nigricollis*, and not *L. ruficaudatus*.

† Thus extended, indeed, the genus will bear further separation: *Chaitaris* comprising *Ch. grandis*, *Ch. sundara*, *Ch. McGregorii*, and *Ch. auricularis*; whilst the (*aurea?* vel.) *banyumas*, the *rubeculoides*, and the *Saxicola nigrorufa*, Jerdon, constitute another small group more nearly allied to the Flycatchers.

P. 110. The *Ichthyaëtus cultrunguis*, Nobis, proves to be merely the young of *Haliaëtus blagrus*, which is not an uncommon species in Lower Bengal. *H. plumbeus* of Hodgson (referred to) is identical with *Ichthyaëtus Horsfieldi*, likewise here met with.

P. 112. *Numida maculipennis!*, Swainson. A domestic example of this redoubtable alleged *species* is now in the Museum.

P. 113. I have here given a list of the wading birds of the families *Scolopacidae*, *Charadriadae*, and *Rallidae* of Vigors, and also of the *Anatidae* and the Grebes, which I had obtained in the Calcutta bazar up to the time of writing; and now, with another year's experience, I have little to add to my former catalogue, and few modifications thereof to offer.

Totanus ochropus and *T. hypoleucos* I have since met with, but neither is common, the former usually occurring in pairs, the latter in small flocks. *Tringa platyrhyncha*, of which I saw and obtained but one specimen throughout the preceding season, has been tolerably common during the last. *T. Temminckii* is chiefly brought about the commencement and close of the season, two or three specimens frequently occurring among the heaps of *T. minuta*, and occasionally greater numbers, even as many as three or four dozen together; yet out of this multitude, the collector may fail to obtain a single specimen fit for preservation, from the vexatious habit most of the dealers will persist in of partially plucking every bird they bring, despite all that can be said to them, and thus ruining many ornithological desiderata; it is thus that I have been unable to get fine summer-plumage specimens of this bird, though many were brought.* *Terekia Javanica* (vel *orientalis*) is rare, as I saw but a single specimen during the preceding season, and two only in the course of the following one. *Scolopax heterura* is seldom brought except about the beginning and end of the cool season, when it is numerous. *Rhynchea Capensis* breeds here. *Squatarola cinerea* should not have been termed common, as it is rather unfrequent (I obtained extremely fine summer-plumage specimens in May, and also of *Tringa subarquata*, the latter being numerous); Mr. Jerdon has lately obtained *Sq. cinerea* in Southern India. The "larger species of Ring Plover," mentioned in my list, comprised two very similar species which I will notice presently. I have recently obtained a pair, separately, of *Ch. Cantianus*. *Pluvianus Goensis* is common: *Pl. bilobus* rare: *Pl. cinereus*, Nobis (*J. A. S. XI*, 587), has now and then occurred during the past season: and the undetermined species, with powerfully spurred wings, mentioned in a note, proves to be the Australian *Pl. lobatus* (v. *Lobivanellus lobatus*, Gould, and *Vanellus gallinaceus* of Jardine and Selby's 'Illustrations,' agreeing with the figure by the latter authors in the degree of development of the naked skin of the forehead, which is much less than is represented by the former naturalist); it is not Indian: two other species which are so, and have not yet been obtained by me, are *Pl. ventralis* figured by Hardwicke and Gray, and *Pl. spinosus*? the *Black-sided Sandpiper*, Latham, also figured by Hardwicke and Gray. † *Edicnemus crepitans* — I have obtained one specimen. *Parra Sinensis* in breed-

* Mr. Jerdon has once obtained *Tr. Canutus* near Madras, which he has sent to this Museum, and recently, as he writes, *Tr. alpina*. Both may be presumed to be very rare.

† For a natural arrangement of the Plover group, by Mr. Strickland, where for the first time the respective value of the characters derived from the presence or absence of a back toe, and the form of the wings and general character of the plumage, are duly recognised, vide *Proc. Zool. Soc.* 1841, p. 32.

ing plumage is common during the rainy season. To the list of *Rallidæ* may be added *Gallinula lugubris*, Horsfield, and *Rallus* (?) *rufescens*, Jerdon : but I have scarcely obtained any examples of this group during the past season, as no *shikaree* has regularly brought them; whereas formerly one came daily with a cageful of *Porzana maruetta* and *P. Bailloni*, with occasionally other species, as *P. rubiginosa*, *Rallus aquaticus* and *R. Javanicus*, &c. For remarks on the Indian species currently referred to *Gallinula chloropus*, vide p. 887: it is distinct from the European *chloropus*, of which I have lately seen a specimen killed in the Mauritius; being inferior in size, with constantly a much less developed frontal shield: hence I propose that it should be termed *G. parvifrons*: Mr. Jerdon informs me, however, that he thinks he has lately obtained the true *chloropus*, additional to the smaller species, in Southern India.

The specimens of *Podiceps cristatus* formerly mentioned, I have since ascertained to have been from the Cape of Good Hope; and up to the present time have only obtained *P. minor*, which is abundant.

Of *Anatidæ*, there have been no additional species: and the only remark I have to make is that *Fuligula nyroca* has been far from plentiful last season, whereas in the preceding one it was particularly abundant. *A. boschas* has never occurred, though so many of the common British species are at least equally numerous in this neighbourhood.

In the Society's Museum is a specimen, received from the Cape of Good Hope, of the *Fuligula mariloides* lately characterized in Mr. Yarrell's 'History of British Birds.' Being well acquainted with *F. marila*, though the Museum does not contain a specimen of it, I never could assign the present bird to that common British species, and it remained unlabelled till the arrival of the number of Mr. Yarrell's work containing the figure and description of *F. mariloides*. The Society's bird is, however, considerably less bright in colour than that described by Mr. Yarrell, being probably a young male. Head and neck as in the description referred to, but the crown much darker, or glossy reddish-dusky, passing as a line down the back of the neck; lower part of the neck and sides of the breast dusky, the middle of the latter dark brownish, becoming gradually paler on the belly; sides a little speckled, and the feathers margined with light rusty-brown; whole upper-parts dusky-brown; interscapularies margined with pale brown, and all minutely speckled with the same; wings brownish-dusky, a little speckled anteriorly, the coverts of the secondaries white at base, forming the speculum, and tipped with dusky; most of the tail-feathers margined with dull whitish; and a light colcothar tint upon the flanks: length of the closed wing eight inches and three-quarters; of the bill to forehead an inch and three-quarters. I can feel no doubt of the specific identification.

The two very similar species of Ring Plover must now be reverted to, the description of which has been postponed (p. 179).

Charadrius Geoffroyi (?), Wagler. For this presumed identification I am indebted to Mr. Jerdon. Length eight inches and a half to eight and three-quarters, by seventeen and a quarter to eighteen inches in extent; wing from bend five inches and a quarter to five and five-eighths; and tail an inch and seven-eighths to two inches: bill to forehead an inch; and tarse an inch and a half. Winter plumage greyish-brown on the upper-parts, ear-coverts and beneath the eye, and sides of the breast; the

rest of the under-parts, with the feathers immediately above the bill, and a streak over the eye, white; primaries darker, and the secondaries partly white on their outer web. Bill wholly blackish; legs pale greyish-green, the toes darker. In summer dress, the forehead, lores, ear-coverts, and beneath the eye, are black, having a white mark on each side of the forehead; the neck and breast are bright rufous, contrasting with the pure white throat; the head is deeply tinged with rufous, more or less; and the back and especially the scapularies are partially margined with the same. This bird is much less common than the next, and I have only now and then found one among the heaps of the other species in the bazar: Mr. Jerdon has recently met with both in Southern India; and the Society has received both species from Mr. Hodgson of Nepâl. *Ch. Geoffroyi* is described by Wagler from Pondicherry.

Ch. Leschenaultii (?), Lesson, *Man. d'Orn.*, II, 232. *Ch. griseus* (?), *Mus. de Paris*. For these presumed identifications I am also indebted to Mr. Jerdon. Precisely similar both in summer and winter plumage to the preceding species, but considerably inferior in size, with a proportionably smaller and rather differently shaped bill. Length seven inches and a quarter, by fifteen and three quarters in extent; wing five inches, tail an inch and seven eighths, bill to forehead three quarters of an inch, and tarse an inch and a quarter. Irides blackish, as in the other; legs more or less plumbeous, the toes darker. The young have the scapularies and wing-coverts, and the feathers of the back more slightly, margined with pale fulvous, and a distinct tinge of the same upon the breast. This species is brought in great numbers to the Calcutta bazar throughout the season, but neither it nor the preceding one can be obtained in summer garb before May.

P. 199. *Timalia Horsfieldi*, Jardine and Selby, is identical with *T. hypoleuca*, Franklin, which latter appellation holds precedence. I understand that both this and *T. hyperythra*, Franklin, have recently been figured by M. Guérin in his *Magasin de Zoologie*. The former constitutes Mr. Hodgson's genus *Chrysomma*.

Mirafra Assamensis is not the species assigned doubtfully to *M. Javanica* by Mr. Jerdon; and allied to the latter are two or three in Southern India which I shall leave that gentleman to describe. One, the *Aggun* of the South (*M. cantillans*, Jerdon, *M. S.*), I have also obtained near Calcutta. It is a particularly fine songster.

P. 201. The species assigned by me to *Alauda gulgula*, Franklin, and *A. gracilis*, Nobis, had also better remain in abeyance for the present. The former, however, may be here styled *A. Gangetica*, vide description, *loc. cit.*

P. 202, and also p. 587. For *Carbo pygmæus* read *Phalacrocorax Javanicus*, which is common in the Hoogly. Indeed, *Ph. Africanus* (stated by Lesson to inhabit India) would seem to be no other.

P. 203. Two species are confounded under the description of *Muscipeta atriceps*, Nobis; the supposed female being my *M. plumosa*, p. 791. The former is nearly allied to *M. Borbonica*, which the Society has since received from the Isle of France, but is larger.

P. 204. The *Prinia pileata*, Nobis, must be referred to *Timalia gularis*, Horsfield, vide p. 794.

P. 455. Genus *Manis*. I have recently had the various Pangolin skins in the Society's Museum relaxed and mounted, when it appeared that the observations of Lieut. Tickell and others respecting the mode of progression of *M. brachyura* do not

apply to the genus generally. That species walks pretty much in the manner of the *Myrmecophaga jubata* of South America, on the soles of the hind-feet, while the huge claws of the fore-feet are bent up against the palms, the animal resting not exactly on its knuckles, but on the basal part of its fore-claws. In *M. leptura*, Nobis, *loc. cit.*, however, wherein the claws of the hind-feet are much more developed, it would appear that both fore and hind claws turn inward when the creature walks; and in *M. Javanica* it appears very doubtful whether the animal does not walk on the palms of its fore-feet, with the claws straight out in front, as well as on the soles of its hind-feet. At all events, it was found impracticable to double up the fore-feet of the two latter species, as represented in Lieut. Tickell's sketches of *M. brachyura*; whereas two examples of the latter were mounted without difficulty in the attitudes represented by that observer.

P. 456. *Spizaëtus albogularis*, Tickell, has, as I have been informed by Mr. Jerdon, been recently described in M. Guérin's *Magasin de Zoologie* by the name *Asur Kienierii*, received from the Himalaya (?). The latter specific appellation holds precedence.

P. 457. *Strix lugubris*, Tickell; *Ninox Nipalensis*, Hodgson. "Decidedly, I think, the *Noctua hirsuta*, Tem., *Pl. Col.* 239 (289?)" Jerdon. Also *Strix scutulata*, Raffles, *Lin. Trans.* XIII, 280, which name I presume to have the priority.

P. 459. The *Parus Nipalensis*, Hodgson, there described, is the *P. atriceps*, Horsfield, of Mr. Jerdon's catalogue.

P. 460. *Petrocincla Manillensis*, Auct., and *P. pandoo* aut *maal* of Sykes. The birds referred to under these denominations are most puzzling, and I now incline to suspect that these if not four closely allied species will eventually prove to inhabit South-eastern Asia and its islands. In *loc. cit.*, I have described a male from Luçon, which is unquestionably the *Turdus Manillensis*, Gmelin, while there is every reason to presume that the *T. eremita*, Gmelin, refers to its female, as *Petrocincla maal* of Sykes is the female of his *P. pandoo*. The Society has just received a male and female obtained in the vicinity of Macao, which would seem to be of the same species. In these three specimens the tail is perfectly squared, and both the males have the under-parts from the breast bright ferruginous, each feather more or less tipped with cyaneous, then black, and finally with white: axillaries and under wings-coverts also ferruginous in the Chinese specimen, but the axillaries only in that from Luçon; and the female from Macao has likewise a conspicuous rufous tinge on the under wing-coverts: tibial feathers cyaneous in both, and a considerable admixture of the same on the posterior flank-feathers. The Luçon bird has its plumage worn, that from Macao recently renewed; but the mottlings were originally somewhat different in the two. In the latter each feather of the upper-parts has a conspicuous subterminal black bar, and is tipped with white on the middle of the back, scapularies and wings, and with greyish-brown on the crown, neck, and fore-part of the back; these mottlings becoming nearly obsolete on the rump: the feathers of the breast are tipped with white, having a subterminal narrow blackish bar, of a semi-circular form or tending a little to be angulated in some. In the Luçon specimen, these black subterminal bars on the fore-part of the neck and breast are much broader, and of a V-like shape, enclosing a triangular fulvous-white spot; this white being purer and more developed in the other: the feathers of the upper-parts, also, are merely tipped

with dingy-brown, retaining some traces of the whitish extreme tips on the lower-part of the back, and more conspicuously on the scapularies and wings. The Chinese female specimen differs so much from the females of *P. pandoo* of peninsular India, that I cannot regard them as identical in species: its differences corresponding with those of the Chinese male. Head and neck dull slaty with brown margins and paler tips, the latter inconspicuous; back and scapularies with subterminal dusky bars and whitish edges; and the dull cyaneous tinge of the upper-parts increasing on the rump: the entire under-parts are *much paler* than in Indian specimens, being wholly of a dull whitish-fulvous, tinged with rusty on the throat and lower tail-coverts, each feather having two narrow blackish bars, one near the margin, the other central and confined to the vicinity of the shaft. Upon full consideration, I consider the Chinese and Philippine Islands specimens to be of the same species, or *Petrocincla Manillensis vera*.

A second species appears to exist in the specimens from the Tenasserim provinces, and to this I refer a fine male from Darjeeling, where the collector lately employed by the Society never obtained more than this one example. Judging from the Darjeeling specimen (for those from Tenasserim have the tail imperfect), it would appear readily distinguishable from *P. Manillensis* by the shape of the tail, which (instead of being squared) has its outermost feathers nearly half an inch shorter than the middle ones. The mottlings of the upper-parts are nearly obsolete, and those of the lower-parts but little more developed; and there would appear to be generally some trace of ferruginous, more or less: in the Darjeeling specimen this is confined to the lateral margins of two or three of the lower tail-coverts; and successively more developed in two from Tenasserim, as formerly described by me. I shall designate this presumed species *P. affinis*.

The third form is the *P. pandoo* of Hindoostan, which would appear to have never any rufous whatever, and has the tail intermediate in shape to those of the two preceding. M. Lesson doubtless refers to this, when he states the *P. Manillensis* to inhabit India; and with the data formerly before me, I cannot wonder that I also referred it to the same.

P. 461. The *Erythrospiza* noticed is certainly the *Gros-bec Rose des Indes*, or *Coccothraustes rosea*, Vieillot, of the *Dict. Class. d'Hist. Nat.*, and is rightly identified as such by Mr. Jerdon, who adds to its synonyms the "*Loxia Madagascariensis* and *L. totta* of English authors": but the *Fringilla rosea*, Latham, is given as a distinct species by M. Drapiez.

P. 462. The specimen referred to *Polyplectron Northiæ* of Hardwicke and Gray is recognised by Mr. Jerdon as the female *Francolinus spadiceus*, to which the former term may accordingly be attached as a synonym. *Vide* descriptions of both sexes in the *Zoologie du Voyage de M. Bélanger*.

P. 463. *Carbo albiventer*, Tickell, or rather *Phalacrocorax albiventer*. The specific name, however, I fear is objectionable, from applying only to the immature plumage of the species, since I incline to identify with it a specimen from Tenasserim in adult plumage, wherein the feathers of the under-parts are only white at base. The colouring of the back in this specimen is nearly as in *Ph. carbo*; the head and neck dull shining black, slightly tinged with greyish-brown; the throat below the gular skin white, passing above the gape and forward to the eye, where it deepens to light

brown; the rest of the lower-parts black or blackish slightly glossed; and the feathers at the sides of the throat or lower part of the neck are white nearly to their tips, which are broadly terminated with black, and have a silvery spot above this: beak dusky above, the rest whitish; and gular skin apparently has been yellow. Rare in Central India, and occurs in Assam and in the Tenasserim provinces.*

Ptilinopus purpuratus. It has been suspected that different species are confounded under this name, and certainly the specimen from the Caroline Islands, here noticed, would hardly seem to be identical with that figured by Messrs. Jardine and Selby, *Ill. Orn.* pl. LXX. It agrees more with the description in Shaw's 'Zoology,' XI, 67, which I believe is copied from Temminck, who styles it *Columba kurukuru*; but one marked peculiarity consists in the entire tail being tipped with yellow for three-quarters of an inch, while there is no trace of this colour margining the green portion externally. Crown beautiful purplish-lake, with a slight trace of a yellow margin posteriorly; entire neck, throat, and breast, with the lores and ear-coverts, pale greenish-yellow; scapularies, interscapularies, rump, and upper tail-coverts, a full and tolerably bright green, having a slight cast of aureous; wings and basal portion of tail much finer green, the tertiaries margined with greenish-aureous, and (excepting the largest one) having an amethystine spot, not very bright, within the margin; a purplish patch on the fore-part of the belly, the rest of which is greenish inclining to yellow, and the lower tail-coverts are bright yellow.

P. 465. *Gracula religiosa*. The species here noticed I take to be the *Eulabes Javanus* of Cuvier, which is common in the hilly regions of Bengal, and the Society has received it from Nepâl and Tenasserim. The *Gracula religiosa* of Mr. Jerdon's list is what I presume to be the *Eu. Indicus*, Cuvier. In M. Lesson's *Traité d'Ornithologie*, as I am informed by Mr. Jerdon, *Mainatus Sumatranus*, Lesson = *Eulabes Javanus*, Cuv., and *Gr. religiosa*, Latham and Vieillot; whilst *M. Javanus*, Less. = *Eu. Indicus*, Cuv., *Pastor musicus*, Tem., and also *Gr. religiosa*, Latham. The following are the distinctions of the two species known to me, which I give, as I have seen no satisfactory descriptions of them.

Gr. religiosa, Lin: *Eulabes Javanus* (?), Cuvier; not *Mainatus Javanus* of Lesson, but his *M. Sumatranus*. Distinguished from the other by its superior size, the much greater thickness of the bill, which is also more deeply cleft, the large space covered with short velvety feathers on the sinciput, above which there is no continuation of the naked skin from the occiput, and by the more brightly glossed and separated feathers of the forehead and middle of the head. Length eleven inches and a half by nineteen inches in alar expanse; wing six inches and five-eighths, and tail three inches and a quarter. The bill measures an inch and a quarter to forehead through the feathers, and an inch and a half to gape, being above half an inch in vertical depth; tarsi, measured posteriorly, an inch and one-eighth. Irides dark hazel; bill yellow at the tip, the rest bright coral-red; the bare skin of the head and mobile flaps yellow; and legs orpiment-yellow.

Gr. Indicus: *Eulabes Indicus* (?), Cuv.; *Pastor musicus*, Tem.; *Mainatus Javanus*, Lesson. Closely allied to the last, but smaller, with the bill and legs less robust, especially the former, and the patch of velvety feathers on the sinciput greatly reduced in size, being bounded above (as well as below) by the naked skin folded

* Mr. Jerdon writes me word that he has just obtained it at Nellore.

into minute lappets. Plumage quite similar. Length ten inches and a quarter by seventeen inches and a half in alar expanse; of wing five inches and three quarters, and tail two inches and seven-eighths. Bill an inch and one-eighth to forehead, and nearly an inch and three-eighths to gape, being only three-eighths of an inch in vertical depth. Its colour inclines to coral-red, or carrotty, with a yellow tip; and the irides, naked skin, and feet, are similar in hue to those of the other. Described from an old cage bird, which was brought to me dead, but in good plumage; and on my suggesting to Mr. Jerdon that this is probably, from the dimensions he has given, his species of Southern India, the anticipation proved to be correct. I am informed, however, that it is likewise found in Bengal, but have never seen one among the many of the other species constantly exposed for sale by the Calcutta bird-dealers.

P. 586. *Garrulax leucogenys*, Nobis. The specimen, as I am now informed, was brought from China; and it is evidently the *Corvus auritus* of the old authors, or *Garrulax auritus*, hodiè; *Spreo auritus*, Lesson. Mr. Frith has favoured me with an interesting notice of the individual, which was excessively tame and familiar, and delighted (like a Cockatoo) in being caressed and tickled by the hand, when it would spread out its wings and assume very singular attitudes. It was naturally a fine songster, and a most universal imitator. Whenever chopped meat or other food was put into its cage, it always evinced the propensity to deposit the bits one by one between the wires (a habit in common with the Shrikes, and which is also strikingly manifested by the *Kitta venatorius*, and sometimes even by Mynahs); and when a bee or wasp was offered, this bird would seize it instantly, and invariably turn its tail round and make the insect sting this several times successively, before eating it. A large beetle it would place before it on the ground, and pierce it with a violent downward stroke of the bill: a small Snake (about a foot long) it treated in like manner, transfixing the centre of the head, and it afterwards devoured about half the Snake, holding it by one foot while it picked it with the bill, as was its common mode of feeding.

Erase *Caprimulgus macrourus*, for the species is distinct, and not of uncommon occurrence in the vicinity of Calcutta during the cool season: besides this, the *C. Asiaticus* is here common at that time (*both sexes* having the white marks on the wings and tail); and I have procured one specimen of *C. monticolus*.

P. 603. The *Megalurus* mentioned was designated *Turdus toklao* by Buchanan Hamilton.

P. 789. *Vide* note. "The small species of Hawk employed in the N. W. provinces for falconry," writes Mr. Jerdon, "is much more likely the male *Accipiter besra* of my catalogue, or *Dhootee* (*i. e.*, a handful), which is used exactly as described; if not, the male *Khandesra*, also called *Dhootee*, a species which I am confident is quite distinct, but which I have not yet procured."

Genus *Ierax*. The Assamese specimen of an *Ierax* mentioned in the same foot-note is distinct from *I. cœrulescens* and new, being the fourth species of this well-defined group of very diminutive Falcons, which are as follow:—

1. *I. melanoleucos*, Nobis. This is the largest of the four, measuring six inches and a half and upwards in length, with a powerful beak of considerable vertical depth. Colour of *I. cœrulescens*, but the white of the under-parts, superciliary line, and neck-spot, pure and unsullied; and what constitute ready distinctions, the tibial

plumes and under tail-coverts are pure white like the rest, and there is no frontal band, as in the others.

2. *I. Bengalensis*. *Little Black and Orange-coloured Indian Hawk* of Edwards. Length about six inches to six and a half, the wing four to four and a half. Throat, belly, thighs, vent, and under tail-coverts, deep ferruginous; breast slightly tinged with the same: superciliary line white and very broad, crossing the forehead, and continued downward to the neck-spot, which is also large and nearly or quite continued across the nape: rest as *I. cærulescens*. Inhabits Nepâl.

3. *I. cærulescens*, Auct. Considerably smaller than the two preceding, with the black of the sides continued over the whole outside of the thighs: superciliary line, neck-spot, and belly, often more or less sullied with rufous, and the white of the breast less pure than in the first species. Inhabits the Malay countries.

4. *I. erythrogenys*, Vigors, *P. Z. S.* 1831, p. 96. Philippine Islands.

P. 790. "*Ceyx tridactyla*, Lacépède, *Var.*" Is this *C. purpurea*, Lesson, from Pondicherry? The latter can hardly be *C. microsoma*, Burton, *P. Z. S.* 1837, p. 89. "*Hab. in Indiâ Maderespatanâ.*"

P. 797. *Anthus Malayensis*; vide p. 885.

Indian and Malayan Oriolis. In Mr. Vigne's list of collection of birds procured by him in Tibet, Kashmir, &c., published in *Proc. Zool. Soc.* for 1841, p. 6, the name *Oriolus galbuloides*, Gould, occurs, as having been obtained in the Alpine Panjab. I have seen no description of this species, but it is not improbably that referred to *O. galbula*, *loc. cit.*; the specimen of which, obtained in the vicinity of Calcutta, having injured its wings and tail while I kept it caged, and its bill also being somewhat diseased, its differences from *O. galbula* (of which the Society as yet possesses only a young female, killed in France,) if any, are not obvious. The Calcutta specimen is a young male, and remarkable for having no tarse whatever of black either before or behind the eye, which is perhaps one of the distinctions of *O. galbuloides*. A very similar bird, in its plumage, occurs in a collection before me from Macao, which I suspect to be a young female of *O. Chinensis*, particularly from the form of the bill; though there is no trace of a black nape: and I would call attention to the approximating resemblance in the form of the bill of *O. Chinensis* to that of the *Plectrorhyncha lanceolata* of Gould, figured in his magnificent birds of Australia, the nest of which, also, as represented by him, and even the note as described, tending to indicate a near affinity on the part of that Australian bird to the Orioles, much closer, I suspect, than in the instance of the well known Regent-bird of the same country (*Sericulus chrysocephalus*.)

P. 799. The supposed variety of *Tephrodornis superciliosus*, having no whitish line over the eye, nor white on the exterior tail-feathers, may be designated *T. grisola*. *Lanius sordidus*, Lesson, in the *Zoologie du Voyage de M. Bélanger*, appears to be referrible to *T. superciliosus*.

P. 801. Add *Dicrurus æratus*, Stephens, to the synonyms of *Preopterus æneus* in the preceding page. *Dicrurus forficatus*, Gmelin, vel *cristatus*, Vieillot, is stated by Lesson to inhabit Malabar. Which species is intended?

P. 805. Mr. Jerdon informs me that he has recently procured the species of *Turnix* mentioned by Latham as *Var. A.*, inhabiting India and China. Among Dr. Buchanan Hamilton's drawings is that of a species named by him *Turnix tanki*, which is pro-

bably the same. Length about six inches and a quarter, of the tarse two inches. Bill and legs yellow: irides white. Nape bright ferruginous: the back ashy, with faint dark cross-markings; wing-coverts light brown, having each a black spot near the tip, which is margined with pale yellowish; the breast a weak ferruginous, paler on the belly; crown light brown, with blackish margins to the feathers, the ear-coverts and over the eye light fulvescent. Evidently a very distinct species.

P. 808. I have considerable misgivings as to whether the *Coturnix flavipes* here intimated may not prove to be imperfectly mature *C. Phillipensis*, since the proportions and the colour of the legs agree, and I have subsequently obtained the latter in this vicinity: but my impression still is, that my former specimens were considerably lighter in colour.

Perdix Argoondah is *P. Cambayensis*, Auct.

P. 872. The adult males of *Euplectes Bengalensis* and *Eu. striatus* resemble the females when not in breeding plumage, as stated by Mr. Elliot in the instance of the former. Whether the latter be distinct from *Ploceus flaviceps*, Cuv. (but unpublished?), of the Paris Museum, remains to be ascertained. The *Fringilla Manyar*, Horsfield, *Lin. Trans.* XIII, 160, subsequently referred by that naturalist to *Ploceus*, is enumerated in his list of Dr. McClelland's birds procured in Assam; and Mr. Jerdon informs me, that the *Ploceus pensilis*, Vieillot, or *Loxia pensilis* of Latham, is mentioned as Bengalese in M. Lesson's *Traité*.

P. 880. *Herpestes*; vide p. 970.

Kemas hylocrius, Ogilby. "The Jungle Sheep" (of Southern India), writes Mr. Jerdon, in confirmation of my remarks on this animal, *loc. cit.*, "is certainly the Muntjac, which is well known to many Madras sportsmen by that name. I suspect, however, that it is a different species from the Javanese. The *Kemas hylocrius* is called *Ibex* by residents in the Neilgherries,—*Rock Sheep*, or rather *Goat*, by the natives. It associates in small herds on the rocky sides of the hills, and does not betake itself to the woods at all."*

P. 882. It appears that the *Tricophorus virescens*, Jerdon, is the same as *Ixos Psidii* (*Muscicapa Psidii*, Gmelin, v. *Turdus analis*, Horsfield), a specimen of which that I forwarded to that naturalist being thus identified by him; but he certainly never sent this species to the Society, but an example of *Tr. flaveolus*, Gould, as I mentioned *loc. cit.*

P. 886 The *Ardea flavicollis*, Wagler, figured by Hardwicke, is merely the young *A. nigra*: but the former name was applied, I believe, by Latham, and would therefore have the priority.†

P. 883. The specimen assigned to *Phyllopneste rufa* was a young example of my *Ph. lugubris*, as yet undescribed.

P. 970. *Picus strictus*, Horsfield.

The various obligations to which I am under to Mr. Jerdon, late of the 2nd Madras

* "*Capra (Ibex) Warryato*" is a name introduced into Mr. Gray's recent list of alleged new species; but it does not appear from his description of the head only, in what this differs from *Kemas hylocrius* of Ogilby, the animal above noticed.—In a letter which I have just received from Mr. Jerdon, that naturalist also remarks, referring to Gray's paper,—"*The Capra (Ibex) Warryato* is *Kemas hylocrius*, as I dare say you have guessed. The specific name being the Tamool name of the animal." I much incline to doubt whether it occurs elsewhere than on the Neilgherries.

† The Society has just received a Chusan specimen of this bird.

Cavalry, and now Civil Surgeon at Nellore, alike for specimens, valuable information, and the identification of species and reduction of their synonyms, will be duly apparent from the foregoing remarks and emendations.

[Note to p. 168, l. 8 from bottom, at the word "Calcutta," received after the sheet had gone to Press.]

The desired information is given, however, at least in part, in *Proc. Zool. Soc.* for 1836, p. 91, on the occasion of Mr. Owen's first distinguishing the *P. morio*, a skull of which was exhibited together with that noticed in the following passage: "Of the two crania of the Bornean Orangs, one differed materially from the other in size and in the development of the cranial ridges, the larger specimen before the Society [the other being *P. morio*] closely resembled the cranium of the Bornean *Pongo* or adult Orang in the Museum of the College of Surgeons, and differed, in precisely the same respects as that specimen, from the cranium of the *Pongo* (supposed to be Sumatran) in the possession of Mr. Cross, described and figured in the first Volume of the [Zoological] Society's Transactions (p. 380, Pl. 53), which induced Mr. Owen to entertain more strongly his original suspicion, that that cranium belonged to an Orang specifically distinct from the great Bornean species (*Simia Wormbii* of Fischer). With respect to the differences alluded to, he stated that the cranium of the great Bornean Orang was characterized by the more oblique plane of the orbits, and consequently the straightness of the contour of the skull between the forehead or *glabella* and the incisor teeth; the external boundaries of the surface were broad and had a rough irregular surface, probably in consequence of the development of the callous protuberancies which characterize the sides of the face in the adult males of that species. The *symphysis* of the lower jaw was also proportionally deeper than in the (supposed) Sumatran *Pongo*. * * * The sexual peculiarities observable in the cranium of both the Bornean and Sumatran *Pongos* are well marked, and are exemplified, first in a difference of relative size, that of the female being about one-sixth smaller; secondly, in a much smaller development of the cranial ridges; and thirdly in the *symphysis menti* being of less depth, the cranium of the female approaching in these respects, according to the usual law of sexual development, towards the characters of the immature animal."

Now it must be borne in mind that neither the Bornean animal with callosities (or *Simia Wormbii*, Fischer), nor Dr. Abel's Sumatran species (upon which was founded *S. Abelii*, Fischer), are really adverted to in the foregoing remarks; these appearing to be precisely the same, as shewn in the text: but two additional forms of this genus, both differing from the animal with callosities (as identified by Mr. Brook), and resembling each other, in the union of the frontal ridges posteriorly along the vertex. With regard to the rugosity of the orbits, noticed by Mr. Owen in the male Bornean skull, the same is observable in the female Bornean skull of that species in this Society's Museum; although it would appear that the animal in question does not possess the callosities: and as compared with the lower jaw of Dr. Abel's Sumatran specimen (of the animal with callosities), that of the female Bornean skull here noticed has the ascending portion of the jaw very much wider (in the *antero-posterior* direction), measuring two inches and three-quarters on a level with the insertion of the molars; while the corresponding breadth in Dr. Abel's male specimen is but two inches and a quarter: the chin also is very differently formed, being deeper and more slanting in the latter, while in the other it is sooner rounded off, and the alveolar portion of the jaw is of more even depth throughout, the termination of the *symphysis* being carried farther backward. In fact, the lower jaw alone exhibits a very striking difference in each of the three species of Orangs before me, sufficient of itself to warrant the *suspicion* of their being distinct.

JOURNAL
OF THE
ASIATIC SOCIETY.

First Report by Dr. JAMESON of his deputation by Government to examine the effects of the great Inundation of the Indus. See Journal Asiatic Society, Vol. X p. 615—620.

From the Envoy to the Court of Lahore, to T. H. MADDOCK, Esq. Secretary to the Government of India, with the Governor General, dated Camp Kurnaul, 28th January, 1843.

SIR,—I have the honor to transmit a copy of a Report received some time ago from Mr. W. Jameson, Assistant Surgeon, of his expedition to the Indus in 1841, to examine the effects of the flood caused by the disruption of the obstacle that had for several months obstructed the course of the Indus within the mountains.

2. Dr. Jameson failed in his intention of penetrating up the line of the Indus to the supposed locality of the cause of this extraordinary inundation, owing to an attack made upon him and his Sikh escort while he was making a geological survey of the Khuttuk hills, west of Peshawur, where coal beds were believed to exist. When, after many weeks, he was liberated by the assistance of the Sikh Government from the fort of Kohat, the Cabool insurrection and its consequences had rendered it impracticable for the Sikhs to secure for him a safe passage up the line of their western frontier, by which it had been proposed to convey him to, or towards, Gilghit and Khafferistan.

3. I had introduced Mr. Jameson to the Lahore court, where he was cordially received. I had provided him with presents suitable to the wild people he was going to visit. He had received the usual presents and

“*zeafuts*” at the durbar, and was keeping, as instructed by me, a debtor and creditor account of all such transactions. The whole, however, was plundered, leaving a balance on that account against Government of Rs. 2,887 : 7 : 5, which amount I have embodied in my Toshah Khanah account, which is periodically submitted for the sanction of Government.

4. I beg leave to annex an estimate of the value of Mr. Jameson's private property. He lost every thing he possessed, excepting the clothes upon him. Some compensation to a scientific and enterprising young man, who was thus employed by the orders of his Government, would, I think, be money well laid out.

I have, &c.

(Signed) GEORGE CLERK, *Envoy*.

Envoy's Office, Camp Kurnaul,
28th January, 1843.

(Copy.)

TO GEORGE CLERK, ESQ. *Governor General's Agent, North Western Provinces.*

SIR,—In reporting my arrival at the Political Agency, North Western Frontier, I have the honor to lay before you a brief statement of the route I followed in crossing the Punjaub, and from the Indus to Peshawur ; at the same time premising, that I shall as soon as possible give a detailed report of my proceedings, which I regret to say must be very imperfect, owing to the loss of all my notes, collections, &c.

2nd. I have already communicated to you what passed at the interviews I had the honor to receive from His Majesty Sheir Singh.

3rd. From Lahore attended by an Agent of the Durbar, Alif Shah, twenty Suwars, a Havildar, and eight Sepoys, I proceeded in a NNW. direction, crossed the Chunab at Ramnuggur, and from thence to Jelalpore on the Salt range. Here I remained for some time to examine the interesting geological phenomena presented, then marched along the foot of the mountains to Pind Dadur Khan, opposite to which, but about three coss distant, are the great Salt mines, named the Koura mines. From the mines all the salt is brought to Pind Dadur Khan, and then sold by Rajah Golaub Singh's officers. After visiting these mines, and examining the neighbouring country, I ascended the hills at Bara, and marched to Maree on the Indus, via Choia, Sidan Khan, Khotas,

Durabbi, &c., on a generally barren country, a characteristic mark of these thinly populated mountains. Here and there, only in the neighbourhood of villages, was vegetation met with.

4th. At Maree, I first witnessed some of the devastating effects of the river's inundation that had taken place about six months before, and as you had directed my attention particularly to the examination of this district, under which is comprehended that of Kalabágh, distant about half coss, and on the eastern side of the river, in order to ascertain whether coal was to be met with fit for steam vessel purposes, I remained here a few days, and then prosecuted my researches up the river as far as Sharkar, to determine if the same system of rocks (saliferous system) existed to the northward, and also to witness the extent of the ravages committed by the great *debacle*. After an absence of six days, I returned to Kalabágh, re-examined the various interesting fossiliferous deposits in that neighbourhood, abounding in the remains of fish and saurian animals (?) and coprolites. I mark saurian animals with an interrogation, as the fossils were not of so perfect a nature, as to allow me to say definitely, whether the remains belong to saurian reptiles or saurid fishes. They are met with in a red sandstone, (the equivalent of the new red sandstone of Europe,) which is superimposed by the red marl, along with which the rock salt, gypsum and alum slate, occur. In some places a limestone is met intervening between the red sandstone and red marl, abounding in fossil organic remains; and at Jellalpore, where in some places the red sandstone is wanting, we have the marl resting immediately upon a limestone without fossils, and presenting all the mineralogical characters of the magnesian limestone of Europe.

I left Kalabágh on the 26th for Cohat, following the route of Elphin-stone.

5th. From all the chiefs whose country I passed through, viz. Alla Yar Khán, of Kalabágh, Ghoolam Mustafa Khán, Ghongree of Shakurdurrah, Russool Khán Khuttuk of Elaichi, I received attention, and was by each of them furnished with a guard, having, as requested by the Maharaja, discharged at Maree the twenty Suwars.

6th: I arrived at Cohat on the evening of the 29th November, and was met by Futeh Khán, the Naib and brother-in-law of Sooltán Mohamad Khán, in whose name all orders are issued, and the revenue collected. Next morning he again waited on me, accompanied by several

chiefs, (Aga Medi Khán, Oomr Khán, &c.) the Lahore Killadar, and Alaf Shah. Aga Medi Khán apologized for Sirdar Kadar Khán not visiting me, he being unwell. After some general conversation, I was asked the object of my journey, how long I intended to remain, &c. In reply I stated, that I would proceed forthwith; Futeh Khán Aga Medi Khán then remarked, as the former had done the evening previous, that the direct route to Peshawur was not safe, several parties having been lately plundered by the Afreedies. To confirm what they said, they referred to Maharaja Sheir Singh's Killadar, who corroborated their statement, and remarked that now no Sikh party could proceed in safety by this route. Such being the circumstances, and there being no object to be gained in proceeding by this route, I proposed to march viâ Attock. To this they objected, and remarked that it was unnecessary; for, if I would inform General Avitabile, arrangements would be made in a few days to enable me to proceed by the direct route. Alif Shah then asked them (chiefs) why they did not summon the chiefs of the Afreedies? To this they replied, that since the departure of Sultan Mohamad Khán, who had been called to Lahore by orders of the British Government, they had lost all control over the hill tribes. I wrote to Captain Mackeson, and mentioned what I had been told by the authorities of the place, and at the same time intimated that I would either proceed by Attock, or by the direct route to Peshawur, as he should deem fit.

At the interview, the chiefs alluded to the unsettled state of their country; and said that during the night a party of Afreedies had visited my camp, and carried away a report that I had much treasure, (this report was prevalent in the bazar of Cohat, and appears to have reached Peshawur, Captain Mackeson having mentioned it in one of his letters,) and that unless I removed my camp within the walls of their fort, they would not be answerable for its safety. Alif Shah having urged me to adopt this measure, owing to the weakness of my guard, and the authorities refusing to strengthen it with some of their own people, I reluctantly did so, imagining that it would be the means of confirming the hill tribes in their supposition. The true cause of the chiefs being so anxious for me to quarter in their fort I afterwards ascertained, and shall forthwith notice.

In the evening I removed to the fort of Sirdar Kader Khan, the nephew and son-in-law of Sooltan Mohamad Khan. It is rather a forti-

fied village, having a high mud wall, and at the four angles bastions. Nearly all the villages that I saw beyond the Indus were fortified in a similar manner; from the town of Cohat it is distant about a quarter of a mile. The town of Cohat consists of several divisions or villages apart from each other, and in the centre there is a large mud fort garrisoned by three hundred of the Lahore troops. Formerly the guard was relieved every six months, but the present party had been there upwards of a year, and without any prospect of relief or pay.

Next day (1st December) I was visited by Sirdar Kader Khan, who apologised for not visiting me on my first arrival. He was particularly inquisitive regarding the objects of my journey, the cause of my coming to Cohat, &c.

7. When at Kalabágh, and prior to ascending the river, I wrote to Captain Mackeson, mentioning the extraordinary rumours in regard to our troops being in a precarious position not only at Cabul and Jellalabad, but also in many other parts of Affghanistan. Three days after reaching Cohat the answer to this letter reached me, which confirmed the melancholy intelligence received from the natives at Mukud on the Indus, and elsewhere. This was the first authentic information that I had received of the state of affairs to the North West since I left Lahore; none of the letters which you did me the honor to address to me having come to hand.

On the 4th, no answer to the letter addressed to Captain Mackeson having arrived, I told the chief that it would be absolutely necessary for me to march *viâ* Attock, as the season was rapidly advancing; that I had waited two days longer than the time specified as necessary for the receipt of an answer, and as I had stated to Captain Mackeson that I would proceed by either the Attock or the direct route, I should no doubt find that the chiefs through whose territories I would pass, had been informed by General Avitabile of my intentions. Why the answer had not reached, they could assign no reason, further than the *cossid* had been seized by the Afreedies, and detained; and they remarked, that if I would remain a day longer, they would send off forthwith another; they further stated, that the route *viâ* Attock was almost impracticable for camels. This I afterwards ascertained to be incorrect. Early next morning Sirdar Kadar Khan came to my tent, and stated that the carrier which he had dispatched would certainly arrive in the course of the day.

About six o'clock on the evening of the 6th, Duria Khan, one of the Afreedi chiefs in the pay of General Avitabile, arrived in company with Ibrahim Khan, retainer of Shahzada Houssum Khan, a brother of Dost Mahomed, and pensioner of the Sikh Government. They visited me with Alif Shah and delivered a note from Captain Mackeson, intimating that they had been sent by General Avitabile to conduct me by the direct route to Peshawur. With the former there were 50 followers armed with jezails, and at their urgent request I delayed my departure till the 8th. In regard to the directed route, they stated that it was perfectly safe.

8. On the evening of the 7th I received another letter from Captain Mackeson, advising me not to put too much faith in Duria Khan, and that unless the Cohat authorities, as also the Lahore agent, agreed on the practicability of the water, not to proceed by it. On the receipt of this note I sent for Alif Shah, and explained its contents, and also mentioned that Captain Mackeson had sent a Persian letter for Seyed Kasim Khan, requesting him to give me every assistance, which I had transmitted to him through Futteh Khan. He then left me, and returned again in about half an hour, and stated that there would be no annoyance whatever en route, as all the chiefs were to accompany me across the Pass; that the letter sent by Captain Mackeson was not for Seyed Kasim Khan, but for Aga Medi Khan, and that all would be ready to move at day-break next morning. Futteh Khan afterwards waited on me and reiterated the words of Alif Shah.

9. Early next morning (8th) I commenced my march, accompanied by the chiefs (Futteh Khan, Aga Medi Khan, Duria Khan and Ibrahim Khan) with their followers.

The Pass formed by the Teera or Khyber range of mountains, which separates the Peshawur from the Cohat vallies, is about two coss distant from the town, and rises to a height of upwards of a thousand feet; its entrance, between two lateral or subordinate ranges, is protected by a small mud fort garrisoned by Futteh Khan's sepoy. Here I was requested to remain; a sepoy, who had gone on to reconnoitre, having reported that a large body of men, amounting to several hundred, had assembled at the summit of the Pass, and that it was their intention to dispute our passage; the alarm was given, and the party of the chiefs, amounting to nearly two hundred horse and foot, was joined by

as many more. A council was held, and it was decided that the chiefs should first go on, and make an arrangement with the Afreedies. After a delay of about half an hour, a message was sent to me to advance, and also a request that I would give particular orders for no one to straggle in the rear; to prevent this I ordered the laden camels, mules, &c. to go in advance, as the ascent was both very steep and rugged, so much so as to induce Alif Shah and several of the Afghans to dismount and lead their horses. Here and there Afreedies, in parties of two and three, were seen moving about on the adjoining hills, watching our proceedings, but all remained quiet till the baggage had reached the summit of the Pass, on which a matchlock was fired as a signal, and from all sides armed men issued. The hills immediately above us, where not a man was seen the moment before, were now covered, and they opened on us a heavy fire, at which the Dooranis, both horse and foot, fled to shelter; not one of them returning a shot, though they were all well armed. I had to run the gauntlet of a heavy fire, but no sooner was I out of the range of their matchlocks, than all firing ceased. I remained for some time at the mouth of the defile, to see whether any of the Dooranis would join me, but none of them doing so I returned to the fort with my followers, of whom however nine were missing; viz. Alif Shah the Sikh Agent, a Havildar and two Sepoys, Lahore service, a servant of the first mentioned Ali Bukhsh Chupprosee of the Ambala agency, two of my own private servants, and a Sepoy; three of these, desperately wounded, (one of whom died a few days afterwards,) were brought to the fort by Futteh Khan's people; the bodies of the others, (one excepted, said to have been cut to pieces,) were recovered and interred next day. The Sikh agent was among the killed.

10th. About an hour after my arrival at the fort, Sirdar Kadar Khan came to me, condoled in the loss that I had sustained, and abused his people for taking me by that route. One by one the different chiefs joined us, each assigning a reason why I had been attacked, and among the number Aga Medi Khan, who stated that he was severely wounded, as did also others who were with him; his wound however was nothing but a contusion received by a fall from his horse, which was shot under him. It was also stated that many more had been wounded, and many horses carried off. This statement I afterwards

found out to be incorrect. In the evening the chiefs were joined by Seyed Kasim (Khán, the first time that I had seen him) who was received with marked respect by Sirdar Kader Khán and others. On asking Futteh Khan, after all the others had left, (who conducted me to a small mud hut for my residence) why his people did not assist me? he replied, that if they had done so, that they (the Dooranis) would have been massacred to a man; that the principal tribes by whom I was attacked were the Bazote, Automkhail and Parkhail, whose chiefs were either in the pay of Captain Mackeson or General Avitabile; viz. Alum Khan, Zemaun Khan and Ishonail Khan, in that of the former; and Rehmit Khan in that of the latter; that Seyed Kasim Khan had aided and abetted them, and that he was a thief and a robber, and at the head of a large banditti who inhabited villages close to Cohat. This is the reason I attribute why the chiefs (Dooranis) were so anxious I should quarter in their fort, fearing lest I should be attacked close to their town.

11th. Next morning I was informed by Duria Khan and Ibrahim Khan, that the cantonments at Caubool had been carried by assault and all the British troops massacred, and this was stated on the authority of a letter said to have been received by General Avitabile, and that the whole country was up in arms. They advised me to leave forthwith, and attempt to cross the Pass during the night. Shortly after they had left me I was visited by Futteh Khan, who asked what I intended to do. I replied that he knew best, and that therefore I would be guided by him and Sirdar Kader Khan, as I was completely in their power. I told him what had been mentioned by Duria Khan; to this he answered that he had double the strength of his garrison, and that as long as I remained in his fort, he would be answerable for my safety.

12th. That same day (9th,) I received a letter for Captain Mackeson, stating, "I hear that Duria has gone to bring you to Peshawur by the direct route; he can do it if he likes." The manner however in which both he and his people had conducted themselves the day previous, shewed that I had nothing to expect from him, the reason he assigned for not assisting me being, that he had not received orders to quarrel with these tribes.

13th. That the Dooranis were aware of the attack being intended, I have not a doubt; but probably were obliged by policy to lead me into the snare. They were at the summit of the Pass a quarter of an

hour before me, but instead of giving the alarm, they remained quiet till I was completely entangled; the first notice I had, as mentioned, of the hostile intention of the hill tribes, was a savage yell, and discharge of matchlocks. If the statement is true, the accuracy of which I have no reason to doubt, that the tribes mentioned were the principal leaders in the attack, then it was impossible for any body of men to enter the Pass without being noticed by Futteh Khan's garrison. To corroborate it, Futteh Khan stated, that all my property was sold in their villages. It is more than probable that the cause why the credit is given to the Bazote Autimkhail, &c. tribes is owing to their chiefs being patronized by Captain Mackeson; the Douranees on the other hand, being excluded from his durbar. But of this, viz. disunion among the tribes inhabiting the Cohat valley, the population of which is estimated at 5,000, there is no doubt, nor are the Douranees on very friendly terms with their neighbour Rossul Khan, whose resources ($4\frac{1}{2}$ lacs,) surpass those of Sooltan Mohamed Khan to the west of the Indus.

14. On the 10th, a cossid arrived from Lahore, with parwanehs from the Maharaja and Minister for Alif Shah, giving him orders to take on the suwars. The man contradicted the statement made to me the day before by the Dooranees, that the Lahore durbar had refused permission to the British troops to pass through the Punjaub, (having passed a large force at Ramnuggar,) which had the effect of altering much of their tone; some of whom were most disrespectful, particularly an individual named Hubbitoula Khan. A few days afterwards Duria Khan left me, having told him that I did not at present require his services; but if afterwards I found that they were necessary, I would send for him. After remaining for some time in Cohat, I offered Futteh Khan Rs. 1,000, for a guard to the Indus viâ Honshialgur, to which he agreed after some demur, and two hours before day-break on the morning of the 28th, I left in company with him and several other chiefs, with a strong body of horse and foot, and crossing the mountainous country belonging to the Afreedies got into the country of Russul Khan, one of whose people joined us. Several of the chiefs returned, as they stated their presence was now unnecessary. Nothing worth noticing happened. In the evening we halted at Pershai, a town belonging to Russul Khan, three coss from the river. His brother, Sirdar Khan, waited on me, and shewed me every attention. Early next morning I marched to the

river in company with Futteh Khan, Oomr Khan, &c. where after presenting them with an order on Peshawur I dismissed them, and then crossed and proceeded to Gumut, from thence marched to Peshawur via Hassun Abdál and Attok, where I arrived on the 6th, having here and there met with much difficulty in procuring bearers for the two wounded men, our story being in general discredited. I left Peshawur again on the 10th, having received four letters ordering my return, and arrived at Feerozepore on the 28th, accompanied by a small guard from General Avitabile.

I have the honor to be, Sir,

Your obedient humble servant,

(Signed) W. JAMESON,

Assistant Surgeon, on a Deputation to the

Camp Lahore, March 17, 1842.

Sources of the Indus.

DR. JAMESON'S *Report on the Geology, Zoology, &c. of the Punjaub and part of Affghanistan.*

TO G. CLERK, ESQ. *Governor General's Agent for the Affairs of the Punjaub.*

SIR,—I have the honor to transmit the first part of my Report, comprehending the Geology of the Salt Range of the Punjaub, and of a part of Affghanistan. I regret that, owing to the loss of all my Notes (a small Note Book excepted) and collections, it is so very imperfect, but still, I trust, it contains some observations worthy of attention.

I have not alluded to the great *debacle* of the Indus, but have deferred its consideration, as also the Zoology of the Punjaub, to the second part of my Report.

I have, &c.

Ambala, June 29, 1842.

(Signed) W. JAMESON, A. S.

On deputation to the Indus.

On the Geology, Zoology, &c. of the Punjaub, and of a part of Affghanistan. By WILLIAM JAMESON, ESQ. M. A., S. C., M. S. C., &c. *on deputation to the Indus.*

The following observations refer to those parts of the Punjaub and Affghanistan which I have personally visited. Prior to crossing the

Sutledge, I had the good fortune to consult Colonel Garden, Quarter Master General, from whom I received much valuable geographical information regarding the countries to the N. by W. and N. of the Indus. With him I marked out the best line of country to traverse, in order fully to accomplish the main object of my journey; viz. to ascertain *the cause of the great debacle of the Indus*, which had taken place a few months before (June 1841,) and caused vast destruction to life and property. Mr. Clerk, on whose representation I had the honor to be appointed by Government to undertake the investigations, sanctioned the route laid down; and on applying to Maharaja Shere Singh for permission for me to proceed through his dominions, his Highness, on ascertaining the object Government had in view, not only complied with Mr. Clerk's request, but also, with his usual liberality, appointed an agent, and a contingent guard to attend on me, and at the same time transmitted orders to the Governors of the different districts to afford me every assistance and protection. The murder of the agent at Cohat, the unsettled state of the Gilghit country, and other circumstances which shall be afterwards noticed caused my recall, before I had proceeded far on my journey.

PART I.

General Observations on the Punjaub, and on the Geology of the Salt Range, and of a part of Affghanistan.

Punjaub.—The empire included under the name of the Punjaub, is now the most important and extensive governed by any independent native prince in India, not only from the great resources at its command, but also from its position, as it commands the whole of the North-western frontier of British India, a direction from whence alone the British empire can be invaded by any power in sufficient force to threaten its stability.

Geographical Position.—The Punjaub properly speaking, comprehends those tracts of country lying between the five great rivers which run from North to South, the most westerly one being the Indus, the easterly the Sutledge. But the restless and ambitious spirit of the late celebrated Maharaja Runjeet Singh, encouraged by chiefs equally ambitious with himself, caused him to carry his arms beyond the Indus into

rocky mountainous countries, which though he overran, are anything but subdued, and are ready to a man, to rise at the first signal reverse happening to the Sikh arms. It is bounded to the East and South East by the Sutledge; to the North by the snowy range of the Himalaya, beyond which its feudatories, the Jummoo Rajas, had carried their arms; to the West by the Khybur and Soliman ranges of mountains; and to the South by the state of Sinde and Bahawulpore. The whole country is of an ovoidal form, lying in a S. W. and N. E. direction, with the apex towards Shikarpore, between the latitudes of 29° and 34° N., and longitudes of 71° and 76° E. and covering about 85,000 square miles. But although this country covers a vast deal of ground, a great part of it only nominally belongs to the Sikhs. This is the case with all the hilly country N. W. of Lahore, Sucket, Mundee, &c. a large portion of the hilly country west of the Indus, with the exception of Peshawur, Dera Ismaeel Khan and Dera Ghazee Khan, which are ruled by Sikh governors; viz. the country to the North and West of Durbund, all the country south of the Teeree or Khybur range, comprehending Cohat, Khuttuk, Kalabágh, &c.

Physical aspect of the Country.—The Punjaub is an extensive flat plain with mountains to the North and West, and open to the South and East, and traversed by five magnificent rivers, the Sutledge, Ravee, Chinaub, Jehlum, and Indus, the fertilizing effects of which, protected and encouraged by a mild and powerful Government, will some day render it one of the finest countries in India. At the present moment, the vast plain presents nothing but a waste, comparatively speaking, with here and there cultivation. Even in the neighbourhood of the very capital itself we meet with extensive jungles, the luxuriance of their rank vegetation shewing what the country could be made. But of all people in India, there are probably none so badly adapted for the plough as the Sikhs; and the other inhabitants of the Punjaub form, comparatively speaking, but a small population for this extensive country. There is nothing, however, which strikes the traveller so much as the scanty population* of the Punjaub, when compared with the well populated country include dunder the protected states. Proceeding from Lahore to Julalpore, viá Kori, Meraliwallah, Allipore, Ramnuggur, Mangut, &c.

* The greater part of the Mussulman agricultural population of the Punjaub are Juts, a class of Hindkees.

we pass over vast uncultivated tracts, with here and there in the centre of the bushy jungle a small village, with some rich cultivated fields around ; now and then breaking up the monotony of the flat plain, we meet with the hillocks marking the sites of towns and villages which are now no more ; but of which the streets and houses have left this memento of their former existence ; or deep ravines, the haunts of the wolf and the jackal. Bands of sand traverse the country in a N. and S. direction, which point out the old beds of rivers, and prove that all of them have been changed. Thus the Sutledge, which formerly ran close to the town of Loodianah, is now seven miles to the northward ; the Ravee which twenty years ago washed the walls of the city of Lahore, runs in a channel three miles off to the northward ; the Chunab which ten or twelve years ago ran close to the town of Ramnuggur, is now four miles distant ; and the same applies to the Jehlum. These changes also are striking in the Indus, where it leaves its mountain channel at Kalabágh. Kunkur, a compact marl, formed no doubt from the deposition of springs that formerly existed, is frequently to be found, forming beds, &c. in the clayey soil. But till we reach Jalalpoore, we do not meet with any other rock in situ.

Soils.—The soil varies in a remarkable degree from stiff clay to sand, mixed with each other in variable proportions and with vegetable matter. Between Jalalpoore and Pind Dadur Khan, it consists of a black rich loam, and is probably the finest we saw in the Punjaub. Mixed up with the soils, carbonate and sulphate of soda are frequently met with, and if in quantity the land is not worth cultivating. Several large tracts are in this manner rendered barren, particularly on the West side of the Indus in proceeding to Peshawur.

Salt Range.—From Jalalpoore, the salt range extends in a N. W. by W. direction on to Maree on the Indus, when it crosses the river, and can be traced from thence onwards to the Khybur or Teera mountains. From it various secondary branches proceed, as one to the N., where it is met with in the neighbourhood of Rotas, and on which the fort of that name is built, forming the Tillah hills of Elphinstone ; it extends for a short distance Northward, and probably then makes a bend to the Eastward. All these ranges join the low group of hills to the North-east, but none of them cross the Jelum below the town of Jelum. These, however, cross there and run on by Bimber, Jummoo, Nurpoor,

and down by the South of Belaspore, crossing the Jumna, at Fyzabad, and the Ganges at Hurdwar.* The whole course from Jelum is as near South-east as possible, like all the other secondary ranges of the Himalayas.† The salt range is parallel to the central or high mountain range.

Rocks.—The rocks met with at Jelalpoore, consist of

1. Limestone,
2. Sandstone,
3. Sandstone Conglomerate,
4. Red and green Marls,
5. Gypsum,
6. Conglomerate.

Conglomerate.—Resting upon the five rocks mentioned, in an unconformable position, there is a conglomerate, held together partly by calcareous and partly by siliceous matter; in it occur rounded masses or boulders of granite, syenite, trap, quartz rock and limestone, &c., the last of which abounds with organic remains. We meet with this rock in situ some miles to the Westward, and on the road leading to Kalabágh, as well as at that place, it points out the direction followed by the stream which deposited the conglomerate.

Limestone.—It is very compact, and varies in colour from greyish white to greyish black; it is devoid of organic remains, and forms the highest parts of the mountains, rising to a height of about 1500 feet above the river Jehlum.

Sandstone Conglomerate.—The town of Jelalpoore is built on the inclined sandstone conglomerate strata, and principally of that rock. It has a very pretty appearance, the houses being neatly arranged in a niche of the mountains, and about sixty feet up the acclivity, the name dates back to the time of Jehangeer, at which period it was large and populous; the ruins, now seen about two hundred feet above the present site, testify to the accuracy of the statement. It was destroyed by Runjeet Singh about the commencement of his career, it being then principally inhabited by Mussulmans. Hindoos now form the bulk of the population. On the hill overlooking it, are the ruins of an old fort, which appears to have been almost entirely built of boulders.

* Journal of the Asiatic Society.

† Elphinstone's Caubul, vol. II. p. 407.

All the rocks, with the exception of the conglomerate mentioned, are highly inclined, the angle varying from 35° to 60° ; there is no uniform direction, as they dip N. E. and W.; nor is there any plutonian rock seen to account for this extraordinary arrangement.

Gypsum—Economical Uses.—The gypsum occurs imbedded in the red and green marls, its color being either white, rose or brick red; from this place to the river, which is only distant half coss, masses of any size might be carried, and it is found here equal to the finest gypseous alabaster of the European continent; it is of this substance that the beautiful groups of small white figures and vases imported from Italy are made. The celebrated plaster of Paris is procured by exposing this rock to heat, which deprives it of its water of crystallization, it then falls to the state of a white powder, which has a strong affinity for water. Captain Franklin speaking about this rock, as found among the Himalayas, says, "It is probable that its chief use in Bengal for some time, would be as convertible into plaster of Paris, and affording a material for cornices and ornamental work, to the banishment of the very rude productions of this kind that we have hitherto put up with." There is *perhaps a sufficient quantity of it* to answer any demand likely immediately to arise. When the Government House was last repaired, it was considered desirable to obtain a sufficiency for the purpose above-mentioned; but the fact of its occurrence within our own mountain provinces was not known at that time; *as it is within fifty or sixty miles of water carriage, it might be expected to pay for its transport.* In addition to its value in the arts, it forms an excellent manure, and could be applied with great advantage to many of the soils in the Punjab. To the native its uses are quite unknown; but when it is appreciated, or rather when the country falls into the hands of a Government which knows its value, we may venture to predict, from its occurring in such vast quantity close to the banks of the river, that it will form a valuable article of exportation to Bombay, &c. or even now, as by the excellent arrangements made with the Lahore Government by Mr. Clerk, it is not liable to duty. To the Bombay Government therefore the gypsum is well worthy of attention, seeing that it might be most advantageously used in the public buildings, in making the ornamental works, and for many other purposes; and it would, as Captain Franklin remarks, afford the proper material for making cornices to the exclu-

sion of the rude articles now in use. The experiment is well worthy of a trial, whether executed by Government or by private means; if by the latter, and encouraged, it would no doubt yield a good return.

Proceeding along the hills in a W. by N. direction, we reached the village of Aaganwallah, distant about four coss. The inhabitants are principally Awans;* we ought rather to say *were*, seeing that it is almost entirely deserted, owing to the rapacity of Raja Goolab Singh's soldiery. To reach the village we proceeded up the banks of a small ravine, and as we approached its vicinity, we found the road all paved with rounded boulders, which are strewed over the whole country. On the hill above them is a fort garrisoned by 200 of the Jummoo troops.

Gypsum in enormous beds of 13 feet in thickness and upwards is here met with; and associated with it, the pure crystalline variety, named selenite.

Jutaneh Salt Mines.—A few miles further to the W. and by N. is the village of Kewal, where we pitched our camp, and proceeded to examine the salt mine of Jutaneh, distant about 4 coss. The road lies along the base of the mountains, and abounds with ravines. On the acclivity is seen the pretty village of that name, surrounded by palm trees; it is the residence of the miners, and contains about two hundred inhabitants. The mines, however, are about two miles further on, but beyond this all the water is either salt or brackish, and to reach them, we proceeded up the bed of a small nullah, by the action of the stream of which the strata have been well exposed. The mines, three in number, are about 45 feet above the bed of the stream, and have been opened 20, 30 and 35 years respectively; the shafts are about six feet in height and three in breadth, varying in length from 140 to 180 yards, and sunk through the red marl, in which rock the rock salt occurs imbedded. It also contains large imbedded masses of gypsum, which in many places are highly polished by the mere friction of the miners' bodies in passing and repassing. The descent is down a gradually inclined plane till we reach the principal bed, when we descend into the body of the mine by steps cut in the salt. Before arriving at the principal bed of

* The Awans, according to Elphinstone, belong to the class of Hindkees; they form nearly the whole population of the country on the East side of the Indus to the South of Attock. Some part of the country is occupied by the Khuttuks and Bauricks.

salt, however, we pass several smaller ones, varying from three to six feet in thickness; the largest, the one now worked, is from 170 to 200 feet.

Mines.—The dress of the miner consists of a small piece of dirty white cotton cloth wrapped round the middle of the body, a similar piece round the head; and to protect his shins from the splinters of rock salt, a thick pad of black woollen cloth is worn. His tools are few in number and of a simple nature; viz. a large hammer, sharp-pointed at one end and flattened at the other, chisels and handspike; with these, he removes masses varying in weight from three to four pukka maunds (240 to 320 lbs.), two of which are a camel load. Smaller masses are also removed to load oxen, &c. In removing the large masses accidents, owing to the narrowness of the shafts, frequently occur. To light up the mine, small oil lamps are used, appended to which are long hooks, in order to fasten them to any projecting piece of rock salt. The miner is capable of removing from situ eight pukka maunds per diem, for which he receives an anna per maund, but he supplies himself with tools and oil, which cost four annas. On carrying the salt out of the mine, an additional two annas is given; this however is the work of another individual, who is capable of removing sixteen maunds per diem. By camels, bullocks, &c. the salt is conveyed to Pind Dadur Khan, (as no salt is allowed to be sold at the mines,) and there sold at the rate of a rupee the pukka maund. When the Maharajah Runjeet Singh held the mines in his own hands, a rupee was charged for a camel load; but prior to farming them out to the Jammoo Rajas, he had raised the price to 2 rupees. Now the price of a camel load varies from 6 to 8 rupees, and before reaching Ambala, paying hire, duty, &c., it costs from 8 to 20 rupees.

The salt is sold in the bazar at the rate of from 13 to 15 seers per rupee.

The mines are guarded by a party of the Raja's hill troops. In the central division of the town of Pind Dadur Khan, (it being divided into three,) which contains about 10,000 inhabitants, there is a mud fort also garrisoned by a battalion of their troops, with some horse artillery; facing it, there is a wide plain on which the salt was lying in great quantity; here also scales are erected for weighing it prior to loading the camels, of which there were about 70 or 80 present.

Koura Mine.—Further to the westward is the largest mine; viz. that of Koura, so named from a village of that name; it is four coss from Pind Dadur Khan, and the route to it is similar to that which leads to the other mines, up the bed of a mountain torrent, containing but little water, its banks however were in many places covered with efflorescence of salt, resembling much from its pure white color, snow that had newly fallen. The village of Koura built on the acclivity of a small hill is close to the mine, and contains about 250 inhabitants. Here we were met by some of Raja Goolaub Singh's people. The shaft is similar to those already described, but of a greater length, being not less than 300 yards. On sinking it, much practical knowledge has been evinced; thus, in the gallery we frequently pass beds of ten and twelve feet in thickness, these, however, have been cut through, and left untouched, and the shaft carried on to the great deposit; but how the individual who first opened the mine was led to conclude that a large bed of salt existed beyond the smaller ones, (it being so contrary to the native character to risk capital if a means of repaying him with interest, for that he has already laid out, is presented, which undoubtedly the beds mentioned would have done;) whether by the out-cropping of the salt in another part of the hills, from mining operations carried on in some other place, or from geological reasoning, we could not ascertain. Even as to the definite time when the mines were opened, we could not get any information, further than that it was during the time of the emperors. On entering the mine all the natives took off their shoes, and proceeded barefooted. After we had gone down the gently inclined plane some two hundred yards, the air became very oppressive; to descend into the great cavities we found a similar arrangement of steps cut in the solid rock salt, but the sight presented here was truly magnificent, far surpassing any geological exhibition that we had ever witnessed, and well repaid us for our suffocating trip. By the innumerable lamps the mine was well lighted up, which being reflected by the beautiful crystalline walls, formed a splendid and brilliant hall of about three hundred feet in circumference by fifty in height, contrasting well with a deep dark abyss, to the end of which the eye could not penetrate, formed by an old abandoned shaft which water had inundated. Adjoining to this, there are several others in a similar state. The thickness of the principal bed could not

be ascertained, as it occupies the whole extent of the mine, but it is upwards of several hundred feet.

Characters of the Rock Salt.—The rock salt in colour varies from white to flesh or brick red, granular, the concretions being very large and very compact, so much so, that various ornamental articles are cut out of it. I was presented with a series of small vessels of it, which were highly polished; in pieces of about an inch in thickness it is transparent or semi-transparent; it occasionally assumes the stalactitic form, several stalactites of a pure white colour, and more than a foot long were brought to me. This salt is extensively used throughout India, and is so pure as only to require grinding.

At 8 A. M. the thermometer stood in the shade at 45°, in the mine at 82°; but owing to the particular state of the air, it appeared to be much more; to health it is most prejudicial; the natives informed me that all of them suffer severely, after working a few years, from affections of the chest, so much so, that the average period of life with them does not average more than from thirty-five to forty years; all presented a most sickly appearance, similar to that which we observed in individuals living near to marshy districts in the Pinjore valley.

Relations of the Strata.—The relative position which the strata bear to each other, is well seen in the section formed by the bed of the nullah. Here we have a red compact sandstone forming the fundamental rocks, and inclining at an angle of from 35° to 55°; resting upon it we find the red marl in which the rock salt occurs imbedded. Gypsum does not occur in beds, but imbedded masses in the marl. In color the marl is red, green, greyish white, &c. Forming the superincumbent rock there is a breccia, consisting of red sandstone, marl, gypsum, and limestone, held together by calcareous matter, and resting in an unconformable position, as the rock at Jelalpore, and like it the limestone boulders contain organic remains, and in such quantity do they occur as to lead to the supposition, that it has been almost entirely, though not exclusively, formed through the agency of the fossil animals. Since the brilliant discoveries of Ehrenberg with the microscope, which have brought to light a new world of animals, the old dogma, *omnis calx e vermibus; omnis silex e vermibus; omnis ferrum e vermibus*, has been again revived; the size of these animals is sometimes so very minute, that Ehrenberg has proved that a million

may occur in a cubic inch of chalk. But it has been proved that the organic matter does not always bear the same proportion in chalk from different quarters; thus in specimens from the North of Europe, the quantity of inorganic earthy chalk exceeds that of the organic bodies; but in specimens from the South of Europe, the animal remains largely predominate. Ehrenberg in his work on the animalcular constitution of chalk, describes and figures specimens from twelve localities in Europe, Asia, and Africa, all of which are filled with foraminiferous and other minute chambered shells; the number of species amounting to 81, some calcareous and some siliceous, including twenty-two species of microscopic nautilites, nummulites, and cyprides, and forty species of infusori; with these there are a few confervæ and other minute vegetables.* That the calcareous matter which invests the exuviae of molluscous and radiated animals found in the limestone above-mentioned, as also in a nummulitic limestone which we shall afterwards notice as occurring among the Himalayas, the limestone of Caraberg, the muschelkalk of the continent of Europe, the nummulitic limestone of Hussun Abdal, the encrinal and coral limestone of the silurian and carboniferous systems, is a segregation, (as supposed by Buckland and Jameson,) from the waters in which these were deposited, and not formed by the animals themselves, is more than probable.

As we ascend the Pass leading into the salt range which lies four coss to the N. W. from Pind Dadur Khan we cross over a range of limestone abounding with organic remains, similar to those met on the boulders; in height it is about 500 feet, very rugged and steep, and two miles in length. At the summit is the village of Chout, we then get into a large and well cultivated valley, through which our route lay six miles, and cross a small hill of fossiliferous limestone, in which a thick bed of brown iron ore or hematite occurs imbedded, and from Ehrenberg's researches we are entitled to infer, that in it organic remains will be found. Descending a gentle acclivity, we arrive at the small but pretty village of Choia Sydun Shah; from whence the road to Rotas winds along the banks of a small stream, whose water is supplied by a large spring in the centre of the town. Its inhabitants are mostly all fukeers, and it is so celebrated for its sanctity by the Hindoos, as to

* Buckland; Edinb. New Phil. Journ. vol. XXI. p. 441.

cause them to bring the bodies of their relations here, for fifty miles round, in order to burn them. When we were there, there were several burning, and the ashes of others collected in heaps. Of Maharaja Runjeet Singh, who has built a large house, it was a favorite resort, and there was one building for the Jummoo Rajas, (Dhian Singh and Goolaub Singh.) The building material is limestone, the rock of the district. On it in the neighbourhood of Rotas there is a coating of calcareous sinter and tuffa,* fifteen feet or more in thickness, shewing that springs (they bring spring deposits,) were formerly more abundant than they now are. They, as well as the limestone, are extensively used for building purposes, and for making lime.

Springs.—The springs, like all the other springs in the Punjaub and Affghanistan,† which issue from limestone districts, belong to that division which is hot in winter and cold in summer; the temperature of the air in the morning being twenty degrees lower than that of the water. Similar springs were met with among the Himalayas, in the Bijouni valley, between Saeeki Huttee and Belaspore, Cohat, Hus-sun Abdul, &c. The depth of the one at Rotas is said to be unknown. Regarding it there is a tradition which I was told by one of the natives, viz. that a man who had been engaged making a rope for twelve years attempted with it to fathom it, but could not find any bottom. Opposite the spring a *shumianah* is erected, and beneath it a *charpoi*, covered with a white sheet; here a *Grunth*, (the sacred book of the Sikhs,) is placed, and before it sits a man night and day with a punka in his hand, to drive away flies, repeating passages from the sacred volume.

From Rotas on to Maree on the Indus the whole country consists of extensive plains surrounded by mountains, in general barren in the extreme. It is in these that the best horses of the Punjaub are bred, but that does not infer much, as a very good country bred horse is seldom seen.

* Probably this is the rock alluded to by my friend Mr. Griffith in his report on the subjects connected with Affghanistan, when mentioning the sources of springs he says, "The bed of the ravine by which the army descended from Lala Ghurree Beg, was found to be dry to within one mile of Ali Musjid, at a place called Siri Chushma, where there are copious supplies from a soil of cavernous limestone. Indeed, this rock seems to be the principal source of the springs of the country in those parts beyond the influence of the melting of the perpetual snows." *Journal Asiatic Society*, new series, No. 34, page 809.

† See Reports by Lord, Burnes, Griffith, &c.

The higher and mountainous parts of the country are composed of limestone and red marl, and the plains, when an outcrop is seen, of sandstone and conglomerate, the former being sometimes of a green color, and but little inclined. At Kullur Kahar, the conglomerate is unconformable to the other rocks, and in its character differs from that rock at Jelalpore, in the limestone containing no organic remains. Proceeding onwards W. N. W., we cross many mountain streams or nullas, all of them in general receiving the name of Soane, owing to the sand on their banks containing gold, for which it is extensively washed during every month of the year; that of December, January, and February excepted. The gold obtained is similar to that found on the banks of the Indus. From Muzan to Maree the country is still open, till within three coss of the latter, when the mountains contract, forming a narrow defile, the saliferous rocks on either side rising to a height of two and three hundred feet. As we approach near the banks of the river, the country is covered with boulders of trap, granite, syenite, hornstone, porphyry, &c.

Maree and Kalabágh.—Of all geological sites in India, there are probably none more interesting or important than that comprehended under Maree and Kalabágh, the former on the East, the latter on the West side of the river Indus, and distant from each other about half coss; interesting for the nature, position, and organic remains which the rocks contain; and important from its mineralogical riches.

Rocks.—1. Magnesian Limestone.

2. New red Sandstone.

3. Fossiliferous Limestone.

4. Red Marl and Sandstone, with

i. Coal and Mineral Sulphur.

ii. Rock Salt.

iii. Gypsum.

iv. Brown and red Iron Ore.

v. Alum Slate.

The oldest rock met with is the magnesian limestone, which varies in color from pale grey to dark blue; fracture more or less conchoidal, with an earthy aspect; hornstone occurs in it in layers or imbedded masses. The lower beds are destitute of organic remains, but the upper abound in them; the most common fossils being marine shells belonging to the genera *producti*, *spirifer*, *gryphaea*, *nautilus*, &c.

Imbedded in it there are also enormous masses of red and brown iron ore or hematite, which resisting the action of the weather better than the limestone, stand out in bold relief. In many places the needle of the compass is rendered quite useless, even at a considerable distance from the rocks, owing to their being highly magnetic from the quantity of iron which they contain. Resting upon the limestone, we have sandstone, varying in colour from greyish white to dark reddish brown; in some places so soft as to crumble under the finger; in others so hard as to give sparks with steel. The compact dark variety whose colour is owing to the peroxide of iron, abounds with teeth, bones, and coprolites of enormous animals, judging from the size of the first; but whether they belong to saurians or sauroid fishes, we have not been able to determine from the imperfect nature of the specimens, but probably to the latter. In Cutch, a caudal vertebra, said by Messrs. Clift and Owen to belong to a saurian has been found in strata, which appear to belong to the lias or oolite period.* We broke up enormous slabs of red sandstone studded with teeth, some of whose summits were quite flat, being worn down, shewing that the animal to which they belonged had far advanced in years. In the coprolites, teeth and scales occur, pointing out that their habits were carnivorous. In England, in this formation, the remains of two saurian genera palæosaurus and thecodontosaurus have been found,† and they are the most ancient examples of fossil reptiles yet found in the British islands. In their organization, they are allied to the iguana and monitor. In Germany, saurians have been met with in the zechstein limestone, which is the oldest rock on the continent in which these remains have been found; they belong to the genera protorosaurus, also allied to the monitors. It is, however, remarkable that the sandstone in which the organic remains occur at Kalabágh is deeply coloured with the peroxide of iron, and it is a well known fact, that scarcely any are ever found in rocks where this metal is found to abound; thus we often find red and white sandstones alternating with each other, but only the latter containing organic remains; and in England and Scotland it is the grey and calcareous beds. Some exceptions to this rule are met with as in Forfarshire, and Lord Greenock we think, found fossil teeth and coprolites in a red sandstone in East Lothian.

* Grant's Trans. Geological Society, II. Sec. Vol. V.

† See Proc. Geological Society, No. 45, Messrs. Riley and Stuchbury, as quoted by Lyell.

Resting upon the red sandstone we have the red marl in which the rock salt and gypsum occur imbedded. Its colour, as in other quarters mentioned, varies exceedingly, being red, white, blue, green, &c. The rock salt occurs in vast beds of several hundred feet in thickness, exposed and close to the edge of the river, so that when it rises, owing to the hot season causing the melting of the snow in the mountainous regions to the N. and N. N. W., it uniformly washes away a part of the salt; its color is generally red, approaching to rose red, but sometimes white; structure lamellated, but very compact. The gypsum associated with it is either of a rose red, or greyish white colour, and of a granular structure. Like the rock salt, it occurs forming mountains of considerable height; in some places we find it studded with crystals of rock crystal, the colour varying in general with the rock; the most beautiful varieties are the rose red, but they also occur white, grey, brick red, black, &c., varying from transparent on the edges to semitransparent, translucent and opaque; in form generally the six-sided prism terminated by the double six-sided pyramid, but with numerous modifications of the terminal planes, and sometimes the lateral planes are wanting altogether, when we have formed the double six-sided pyramid. In other crystals one of the lateral planes will be large at the expense of all the other five, which are only represented in miniature, but the forms are much too varied to attempt to notice them all. In size they vary from that of millet seed to two or three inches. The resplendent appearance presented by the gypsum when the sun is shining, produced by these imbedded crystals, is very striking. The occurrence of rock crystal in this locality is both very extraordinary and exceedingly interesting, and this is the only one that we are aware of in which silica in a pure state is thus associated with sulphate of lime. In the carbonate of lime or limestone, it is met with, but even in this locality it is rare. The crystals are of contemporaneous formation with the gypsum, and probably have been formed by segregation of silica from that rock. In the rock salt, though much more rarely, crystals are also found imbedded.

Associated with the red marl there is a *white sandstone* in which coal along with *mineral* sulphur occurs. To examine its value and adaptation to economical purposes, particularly steam vessels, was one of the principal objects of my journey to this place. The late lamented travellers, Burnes and Wood, had each reported, I believe, to Govern-

ment, and pointed out that this district would yield coal in sufficient quantity to supply the demand ; if, however, any attention had been paid to the geological structure of the country by them, they could have at once declared that no coal of value or worth working would be found.

Some months prior to undertaking the journey, a series of papers regarding the coal of Kalabágh was put into my hands by Mr. G. Clerk, Governor General's Agent, requesting me to give my opinion as to the probability of coal being found in the district of Kalabágh in any quantity. After perusing the papers, I answered in the negative, unless it was found that the true coal formation, or carboniferous system, dipped under the saliferous system, out-croppings of which might be found containing beds of coal. Such, however, is not the case. But one of the enterprising officers mentioned, has even gone further, and asserted, that "were the salt range, East of the Indus examined by a geologist, there is ample reason to believe, that discoveries of value to Government would be the result," alluding to the discovery of coal. In a private letter to the address of Mr. G. Clerk, an extract of which has been published in the Asiatic Society's Journal, we mentioned the existence of coal, probably the same as found by Burnes* and Wood ; it is not true bituminous coal, and had they examined the localities in which it was found, and the district, they would, had they been at all conversant with geology, have come to the conclusion, that the Kalabágh district would not yield coal in sufficient quantity fit to be used for economical purposes. In no place has *bituminous* coal ever been met with worth working above the magnesian limestone. Statements have been made to this effect, but when properly examined, have invariably been found to be incorrect. In the letter above quoted, dated 15th November, 1841, we state, that the coal met with at Kalabágh occurs in thin seams in a white sandstone that alternates with the red marls in which the rock salt and gypsum are imbedded. The largest seam is, in breadth about seventeen inches, consisting partly of coal, sandstone, and mineral sulphur. The coal met with is partly brown coal and lignite, and partly

* Specimens of supposed coal were transmitted to the late Secretary of the Asiatic Society in 1832, from Luchee, Kurpa, &c. On examination he found, that they were nothing but bituminous slate. How such an error could have been committed in forwarding such specimens, is very extraordinary.

jet and not true bituminous coal; but well adapted, from the experiments which we made on a small scale, for steam purposes, burning with much flame, emitting much gas, and at the same time leaving but a small quantity of earthy matter or ashes.* Probably, however, they were led into error, which even in Britain sometimes happens, by confounding the alum slate, which is of a greyish black colour, and is associated with the white sandstone in which the seams of coal occur. This is not at all improbable, as the colour of the alum slate is so very dark, and so apt to deceive the eye of the traveller; the colour too, is owing to bituminous matter. The use of coal as a fuel is unknown to the natives, being used by them as a medicine in various diseases, and is so much prized as to have led them to suppose, that a large sum would be given for it. From the different seams, about two thousand maunds had been collected and brought to the town of Kalabágh, where it was stored up by a number of individuals, in quantities of from 10 to 100 maunds, for which they expected to get 4 rupees per pukka maund = ₹ 64.

Resting upon the red sandstone, we meet with a limestone abounding with fossil organic remains; it occupies the same position as the muschelkalk, a formation which has only been properly identified in France and Germany. Murchison has no doubt pointed out certain beds in England as its equivalent, as in them he has found many organic remains, which are also found in the muschelkalk or shell limestone. Such characters deserve the highest consideration; but on the other hand, if in another quarter of the world a limestone is found with organic remains, differing from those met with in a rock holding the same geological position in Europe, are we from this character to infer that these rocks are of different ages? If we do this, we are taking for granted, that at the time of the deposition of the saliferous system, the laws which regulate the distribution of the organic kingdom, operated simultaneously throughout the globe. If we look at the organic world of the present day, and trace out its distribution, we find that in each continent, we have a particular series of animals and plants peculiar to it. Thus for instance, let us first examine the mammalogical kingdom. To how many genera does this remark not apply?

* *Journal of the Asiatic Society*, 2d Series, No. 37, p. 2.

Thus in America, we have the genera Cebus, Iacchus, Procyon, Cercoleptes, Didelphis, Condylura, Icalops, Auchenia, Myrmicophaga, Cavia, &c. In Australasia: Echidna, Thylacynus, Dasyurus, Perameles, Ornithorynchus, Phascolarctos, Petaurus, Phascalomys, &c. In Asia, Galeopethicus, Dysopes, Ailurus, Artictes, Paradoxurus, Moschus, &c. Peculiar to Africa and Europe, we could also point out many genera. Again, if we turn our attention to the ornithological kingdom, we shall find the same remarks to apply. Thus proper to America, we find the Genera Pipra,* Rupicola, Phibalura, Casmorhynchus, Gymnocephalus, Procnias, Alector, Crax, Penelope, Dicholophus, Crotophaga, Cassicus, Icterus, Zanthornus, Rhamphastos, Rheas, Tanagra. In Asia, Calyptomena, Satyra, Tetraogallus, Lophophorus, Argus, Polyplectron.

These, however, are only cited for argument, seeing that we could point out genera in every department of animated nature as peculiar to individual continents. Moreover, in the distribution of animals and plants throughout each continent, we find most striking differences depending upon the position. Thus the Zoology of Northern Asia is strikingly different from that of the Southern; the Zoology of Southern Africa, from that of Western Africa; and as we have elsewhere remarked, "as in the Botanical, so in the Zoological kingdom, we shall no doubt find a series of Birds, Quadrupeds, &c. having as their fixed places of abode certain regions of the world, beyond which, though a few may migrate, yet upon a careful examination, the greater number will be found to be confined."†

Such being the state of the distribution of the organic kingdom as now exhibited, are we entitled to infer that it, long prior to the creation of man, was subjected to laws differing from those now in action? Our knowledge regarding fossil organic remains would lead us to infer that such was not the case, though probably during the deposition of the carboniferous, saliferous, and oolitic, wealden, and in the cretaceous and older tertiary systems, the climate in northern regions was then milder than it now is, and that genera of animals and plants were there met with which are now peculiar to tropical regions. Allowing this to be the fact,

* By Dr. Burton a species of pipra is said to have been found among the Himalayas. Is it not a Parus? See Proc. Zool. Soc.

† Journal of the Asiatic Society, No. 85, page 26.

which we must do, as the observations are based upon incontrovertible data, we are not to admit that if we find strata connected with a particular system, and occupying the same position as they do in Europe and elsewhere, and composed of the same rocks, that they, because their organic remains differ, are not of contemporaneous formation. Thus for instance in the limestone rock, which we consider as the equivalent of the muschelkalk, we meet with a coral nearly allied to the *Eunomia radiata*, a fossil met with in the oolite. Agassiz, an authority of the highest order, has asserted, that no species occur in two geological formations, or even in two different parts of one formation; and he says, that he has come to this conclusion, not only from an examination of the species of *Trigonia*, but that it has been confirmed by his examination of fossil fishes and echinodermata.* His statement, based upon ample researches, and a profound knowledge of the subjects investigated, will go far to check that rage which now exists among geologists, of identifying species found in different parts of a formation with each other; but we agree with Brown, that there are species which pass from one subdivision of a formation to the other, and even from one formation into another. Agassiz, to throw aside all observations which have been made by his predecessors, asserts, *that no so-termed character—that is, no observable mark—can be so striking as to indicate an absolute specific distinction; but at the same time it should never be regarded so trifling as to point to absolute identity; that characters do not mark off species, but that the combined relations to the external world in all circumstances do.*† How are varieties to be distinguished? Is the influence of the relations of the external world uniform? Undoubtedly not, and as Brown says, many of the distinctions adhering to individuals are the mere result of such an influence, or in other words, Agassiz wishes to prove, that until the geognostical and geological relations are examined, the species cannot be determined, following an extreme course in opposition to those fossil geologists who maintain, that by an examination of a few fossils, they can tell the age of any deposits.

Many of the fossils met with in the limestone which we consider as the equivalent of the muschelkalk, are nearly allied to those met

* Edinb. New Phil. Journ. No. 63, page 97.

† Edinb. New Phil. Journal, No. 63, p. 97.

with in the same formation elsewhere, but the greater number of them are distinct.

Talking of the relative ages of the salt formation, McCulloch has fallen into a most extraordinary error. Thus, he says, "This stratum (saliferous formation) abounds all over Asia; and he who desires to trace its extent, may apparently do it with safety, by examining the sandy deserts on a map; since wherever they have been described by travellers, it is invariably found that salt occurs in them. There seems no reason to doubt that all sandy deserts of the world belong to this stratum, and hence the salt pools and the brackish water that makes so conspicuous a figure in the narratives of travellers; I may name out of the many, the salt range of hills crossing the Indus at Kalabágh, and extending to Jelapore; the desert of salt between Tehran and Ispahan; that which extends from the Helmund river in Seistan to the range which divides that province from lower Mekran, of four hundred miles in length; and another of equal dimensions, which reaches from Koom and Kashan, to the provinces of Mazanderan and Khorassan. But the most singular tract of it is found occupying the shores of the Persian Gulph in the neighbourhood of Ormuz, not less remarkable for its immense thickness, than for its configuration and colour. It is presumed to be this deposit, from the gypsum and salt which it contains, and from its connexion with the sandy and salt deserts."* He then goes on to trace its distribution in America and Africa, and says, that here also we shall probably form a correct conclusion in considering the sandy deserts of these quarters of the world as appertaining to the same system.† That some deserts may derive their salt from saliferous systems is not at all improbable, but nothing is more erroneous or more incorrect to suppose, that this is generally the case.‡ Thus in the great Thurr or Indian

* Syst. of Geol. vol. ii. p. 229.

† Syst. of Geol. vol. ii. p. 230.

‡ M. Engelhard states, that there has lately been discovered in the salt mines of Hullin implements, and in such a position in regard to the beds of rock salt at present worked, as to lead to the conclusion, that deposits of salt have taken place since the commencement of the working of these mines, formed by the action of water on the previously existing beds of rock salt; and Professor Jameson remarks, that this fact is interesting in many respects, and affords a warning to geologists to be careful to distinguish between original and ancient deposits, and those of a very recent date formed by the action of water, and in an ancient formation. *Edinb. New Phil. Journal*, vol. xxviii. p. 420.

desert, part of which separates the Bickaneer from the Bhawalpore territory, which was crossed by Elphinstone, who has given a graphic account of it, I have been informed by that active and talented officer, Lieutenant Robinson, Agent of the Bhuttee country, that in sinking the various wells in attempting to carry a road from Delhi through Hansi and Bickaneer to Bhawalpore, he has always found the salt in layers, or beds of soil of different thickness; here water was always salt or brackish, but after boring through this bed, another would be found devoid of salt, and the water below it fresh; but it only remains so for a short time, owing to the infiltration of salt water from the upper beds, and which has thrown much difficulty in his way in carrying out his plans. In a few parts of India, do we not meet with vast salt tracts unconnected with the saliferous strata? Thus in the Tirhoot district, Ambala district, Punjaub, &c.; nor on the other hand does it follow that those tracts, which occur in the neighbourhood of the saliferous system, are salt. Thus for instance, the finest soil in the Punjaub is that found between Jelalpore and Pind Dadur Khan, and it is well known, that no soil is worse adapted to cultivation than a saliferous one, it causing large tracts to remain waste; the only use of it being to obtain salt, which is either the carbonate, sulphate, or muriate of soda; nitre too is not uncommon.

Alum Slate.—Next to the rock salt in economical value at Kalabágh is the alum slate, from which large quantities of alum (sulphate of alumina) is manufactured. In making it, there are fourteen manufactures engaged, with from 12 to 18 workmen in each. The alum slate which occurs in great beds alternating with the red marl, and containing beautiful twin crystals of selenite, is brought to the manufactories on donkies, at the rate of an anna per pukka maund.

Manufacture of Alum.—To procure alum, the following is the process adopted: first a layer of wood of about two feet in thickness is placed on the ground, above it a layer of alum slate of about the same thickness, which is sprinkled with water; the layers are continued successively for six or seven times, till the heap reaches to a height of from 25 to 30 feet; the wood is then lighted, and in the space of from 12 to 24 hours, the fire is extinguished. By this time the greyish black colour of the slate is converted into blood red. When cooled a thousand maunds of it are thrown into a brick tank, and

mixed with as much water, where it is kept for three days, or until the water has acquired a deep red colour, the water is then let off into another tank, all the clay being left behind, and from it strained into a large iron boiler, and boiled for three or four hours until the quantity is reduced to a fifth; from this boiler after being cooled, when it is said to be cutcha, and mixed with two maunds of potash, it is conducted to another boiler, and then boiled till it is ready, which is ascertained by removing a small quantity, and if it then hardens into a solid mass it is considered so; when still hot, it is placed in red clay vessels capable of holding three pukka maunds, and after crystallizing the vessels are broken off, leaving an immense round mass of solid alum; it is not, however, quite pure, being of a red colour and semi-transparent; the colour is owing to the iron which it contains. This is the case with most of the alum which we have seen in the Upper Provinces. It is sold at 19 rupees and 4 annas the camel load of 6 maunds, (equal to 384 lbs.), of which however 2 rupees and 4 annas are exacted as duty by the Mallick. After removing the clay from the vat, it still retains the bright red colour, which attracted so much the attention of Elphinstone when there in 1809, who with the eye of a traveller thus notices it: "All the earth, particularly near the town (Kalabágh) is almost blood red, and this with the strange and beautiful spectacle of the salt rocks, and the Indus flowing in a deep and clear stream through lofty mountains past this extraordinary town, presented such a scene of wonders, as is seldom to be witnessed."* How long alum has been manufactured is uncertain, but from Elphinstone's observations, it appears to have been so, though he was ignorant of the circumstance, long before he visited the place.

Nitre.—It is not met with in the immediate neighborhood of Kalabágh; but the soil, from whence it is obtained, which is of a deep black colour, is procured about eight coss to the southward.

The Mallick of Kalabágh, (Ullah Yar Khan,) derives his income, amounting to Rupees 10,000 per annum, almost entirely from the mineral resources of the country. The salt trade, however, is monopolized by Raja Goolaub Sing, who only allows him to sell two boat loads, varying from 300 to 700 maunds per mensem. To the North-west but little salt is exported, as other mines in that direction occur.

* Kingdom of Caubul, vol. i. M. Todd, page 59.

Mundi Salt Mines.—The similarity of the rocks met with at the salt mines in the Mundi country, North of the Sutlej, with those of Kalabágh, is too striking to pass unnoticed. The salt mines occur in a large bason, the fundamental rock of which is compact limestone (magnesian) of a blue or greyish colour, and abounding with layers of brownish black and greyish white hornstone. It rests upon a chloritic slate, which is only partially seen N. of the bason, where a broad trap dyke (greenstone,) partly compact and partly amygdaloidal cuts through them; the amygdaloidal cavities are either filled, half filled, or empty, with calcareous spar, quartz, epidote, &c. In many places the limestone is brecciated, but contains no organic remains; in others, it occurs in thin seams regularly arranged, or mixed up with each other in a confused manner, shewing, that some violent action was in operation during the time of its deposition. The hills, unlike those of Kalabágh, are covered with vegetation, rendering an examination of the relative position of the different rocks to each other intricate, particularly that of the trap to the Neptunian strata. All the rocks are highly inclined, the angle varying from 35° to 70° , and the dip W. and by N.

The marl in which the rock salt occurs varies exceedingly in colour, as at Kalabágh, being red, green, blue, white, &c. and forming hills which rise up in the form of peaks and needles to a height of three and four hundred feet. The needle-shaped formation is produced by the action of the weather, and is strikingly seen here, the rock being very soft and easily yielding to it; it is quite devoid of structure, and abounds with minute crystals of rock salt, which sparkle like diamonds.

Gypsum only occurs in small veins in the marl, and here and there we meet with drusy cavities, filled with specular iron ore, or small balls of iron pyrites, which when broken, present the radiated structure.

The mines of Darang, as those of Mundi are termed, are about 3,900 feet above the level of the sea. In 1839, these were worked, two closed and one open to the light of day. The first that we visited had been worked for three years, and was about two hundred feet in depth, one hundred and fifty of which were through red marl. To descend into it, there was a rude ladder, the steps of which were about $2\frac{1}{2}$ feet

distant from each other, and was divided into three divisions or stages, down which we were lighted by two miners carrying pieces of pine wood, highly impregnated with turpentine, causing it to burn with great brilliancy.

Method of working the Mines.—In working the mines, the most rude method is adopted, the only implements used, being large sledge hammers. The salt which is very compact and imbedded in the marl, and from 50 to 100 feet in thickness, is in all directions traversed by spouts made of the plaintain tree, (the only interior works,) which are used in conducting water to any part of the mine intended to be worked; it by degrees wears away a portion of the salt, and allows the miner to get at the remainder, which he breaks up with his large hammer. This is also the plan followed in working the mine open to day, (quarry,) the water being brought from a distance of about a mile. On enquiring if the water was kept, I was answered with a look of surprise, in the negative; it, from the latter mine, being carried by a winding stream to the Beyah. The salt is granular and very impure, containing a large per centage of iron and earthy matter. After working a mine for some time, they are obliged, owing to the quantity of water, to abandon it, and open one in another quarter, which owing to the softness of the marl rock, is easily done. Many mines were pointed out to us, which had, for the above reason, been lately abandoned.

This rude method of saving implements and manual labor, is unknown in Europe. In the Austrian mines, where the salt is very impure and invariably mixed with much clay, large chambers are formed in them, and filled with fresh water from the surface, which, attacking the sides and roof dissolves the salt, and leaves the clay and extraneous matter to settle at the bottom; after ten days or a fortnight, when the solution becomes sufficiently saturated, the brine is run off to the evaporating houses, and another supply of fresh water admitted; and this is repeated thirty or forty times, till the chambers become so extensive as to endanger the roof, and threaten destruction to the interior works. If this method was adopted at Mundi, which could be easily done, we would have salt equal, or rather superior, to that obtained at the Punjaub salt mines.

Method of removing Salt from the Mines.—In removing salt from the first mine, eight women and a boy were employed, who carried on each

visit two cutcha maunds, (64 lb,) to the godown, distant about half mile, and each individual removes from twelve to fourteen loads per diem. The salt is carried in conical-shaped baskets, the summit of the cone being downwards, so that when depositing it, all they do, is to bend the body forward, and allow it to tumble over their heads. Altogether engaged with the mines, there were 250 individuals, 200 of whom receive four rupees per mensem; the remaining fifty from rupees five to rupees fifteen, which brings up the expense of working the mines to rupees 2,000 per mensem. The sum drawn varies from 3 to 5,000, and the average per annum from rupees 35 to 60,000. The salt is sold at the rate of two maunds = ₹ 160 the rupee. A Paharee carries to Mundi, which is about twelve miles distant, 26 seers, 52 lb, for which he receives two annas, or a third of its value. One half of the men are engaged at the mines, the other in exporting the salt to Mundi, Belaspore, &c.; but as its quality is so very inferior, but little is exported to the plains. It is occasionally brought down to Moubarickpore through Simla. There is another salt mine about fourteen coss to the northward, it yields, however, but a small quantity; viz. fifty maunds. Those of Durung yielding 300 maunds per diem.

In the cold weather, the miner works from 8 A. M. to 4 P. M., but in the morning they complain much of the cold, their only covering being a dirty piece of cotton cloth, similar to that worn by the miners in the Punjaub mines. Nearly the whole of the inhabitants of Durung are engaged in the mines,* a few only cultivating the fields around.†

* By mistake the name of Vingul has been applied in some maps to the mines; the village of that name is about three coss off.

† To health, the employment of the miner here is equally injurious as at Jutaneh, &c., and the causes why it is so, opens up a wide field of investigation. Prior to the Niger Expedition leaving England, the subject of malaria attracted much attention, Dr. Daniel in a lecture delivered to the Royal Institution maintained, that the dreaded malaria, as also the deadly stinking miasma of Africa, producing languor, nausea, disgust, and death, is owing to sulphuretted hydrogen. The jungle fever of India, is also ascribed to the same cause. On the Coast of Africa, the presence of the sulphuretted hydrogen is owing to the action and reaction of the vegetable matter carried down by the tropical rivers, and the sulphates always more or less present in the sea water. This, he proves to be the case experimentally. It is well known that the soils of the jungles of India abound with sulphates of soda and magnesia, must not therefore, he says, quantities of sulphuretted hydrogen be generated? Can science indicate a remedy for this evil? This the Professor answers in the affirmative; viz; fumigation with chlorine, by which a chemical action is instantly produced. Sulphur being thrown

All the rocks, as already mentioned, at Durung, like those of Kalabagh, are highly inclined, but they differ from each other in several essential points, though they, on the other hand, have many things in common. Thus the limestone and marl are mineralogically the same in every character; but in the former no organic remains are met with. Gypsum occurs in great abundance at the latter, and in small quantity in the former, where we have a chlorite slate and trap associated with the neptunian rocks, and with the marl there is a bed of bituminous marl slate, devoid also of fossils; and the alum slate is wanting. The form in which the salt too occurs is different; in the former in the form of a basin or hollow surrounded on all sides by older rocks, and in the latter forming strata with the surrounding rocks. The following Table, No. I, will illustrate the two formations:—

down, hydrochloric acid formed, and malaria and miasma destroyed. The Admiralty admitting the justness of Daniel's conclusions, has furnished the Expedition with chlorine, and no ship hereafter will proceed to that station without this purifier. Jameson's *Phil. Journ.* vol. 31, page 181.—It is a subject well worthy of the attention of the Indian Government. How often are the lives of soldiers proceeding through that malarious district, the Sunderbunds, destroyed by the effects of the miasma. In future no troops ought to be sent by water without having so much chlorine on board. It is also important to know, as has been proved by the experiments of M. M. Melloni and Pazen, that a lighted cigar will in part counteract the bad effects of sulphuretted hydrogen when it exists in the atmosphere, a chemical action taking place, the products being sulphurous acid, water, and a few traces of sulphur. *Phil. Journ.* vol. 33, page 33.—Bischof in a letter addressed to the *Friend of Africa*, is inclined to call in question Daniel's statement as to the poisonous or miasmatic matter deriving its bad effects from the presence of sulphuretted hydrogen, but agrees with him in the advantages to be derived from the use of chlorine. *Ed. Phil. Journ.* vol. 33, page 32.—The cigar has been long appreciated in India by individuals travelling through jungly districts, but its value has only of late been proved experimentally.

No. I.
Saliferous System as represented in the Salt Range of the Punjab and at Durung in Mundi, among the Himalayas, North of the Sutledge.

1.—Saliferous System in the Punjab Salt Range.				2.—Saliferous system at Durung in Mundi.			
Subdivisions	Lithological characters.	Organic remains.	Localities.	Subdivisions.	Lithological characters.	Organic remains.	Localities.
5. Alum slate, ..	Earthy slate contains sulphate of alumina.	None,	Carabagh.	Bituminous marl slate,	Granular bituminous slate,	None,	Durung.
4. Red marl,	Marl and sandstone of various colors, with imbedded rock salt, gypsum, coal, and mineral sulphur, ..	None,	Jelapore, Karabagh, Buckerah, &c.	Red marl, ..	Marl of various colors, containing thin veins of gypsum, and great beds of rock salt,	None,	Durung.
3. Fossiliferous limestone; muschellkalk, ..	Granular or compact limestone, ..	Eunomia, &c..	Carabagh.	None, .. ..	.....	..	..
2. New red sandstone.	Red or grey sandstone,	Bones, teeth and coprolites of Saurians?	Jelapore, Jutaneh, Karabagh, &c.	None, .. ..	.....	..	..
1. Magnesian limestone,	Compact grey or blue limestone, with imbedded hornstone, red & brown iron ore, ..	Upper beds producta spirifer, gryphaea, nautilus, &c.	Jelapore, Kotas, Carabagh, Cohat, &c.	Magnesian limestone,	Compact grey or blue limestone, brecciated, with imbedded hornstone,	None,	Durung.
				6. Chloritic slate,	Granular slate composed principally of chlorite,	None,	Durung.

Saliferous system.

Revenue.—The revenue yielded by the Durung mines is small when compared with that of Pind Dadur Khan and Kalabágh, nor is there any chance of the former being much increased, owing to the nature of the salt, and the inaccessibility of the route for beasts of burden. On the other hand, the latter will ere long assume a very different appearance. From Raja Goolaub Singh's people, who monopolizes not only the whole of the salt trade, but governs the greater part of the hilly country W. of the Jehlum, we could not get any definite information regarding the annual revenue yielded; we believe that it is not far short of fourteen lakhs. The time, however, is not far distant, we trust, that when the country comes under the rule of a liberal and enlightened Government, (which would be a subject of congratulation to the whole agricultural and commercial population,) to see it increased tenfold. The salt will not only supply the whole of Western India, but probably may be exported with advantage from Bombay, &c. The alum can be manufactured in any quantity, and it only requires encouragement and protection to increase this article equally with the salt. On the value of the gypsum, we have already commented. When a change therefore takes place in the government of this country, we shall no doubt see the town of Kalabágh raised to one of the most important in the Punjaub, although no coal has, nor shall be found worth working; but still we shall soon see another power brought into action in propelling vessels, which will do away with altogether the use of fuel; viz. electro-magnetism. Such being the case, we trust not but that important and vital object to the commerce of Central Asia, the opening of the river Indus to free trade, obtained by the advance of the British Army in 1838, will be duly appreciated, and recompense government for the outlay it caused. As soon therefore as this power is brought into play, we may expect to see the trade on this river rival that of its sister-river, the Ganges. But in opening up this river, another grand object has been obtained—a blow given to barbarism in Central Asia, and a way laid open to the advancement of European civilization.

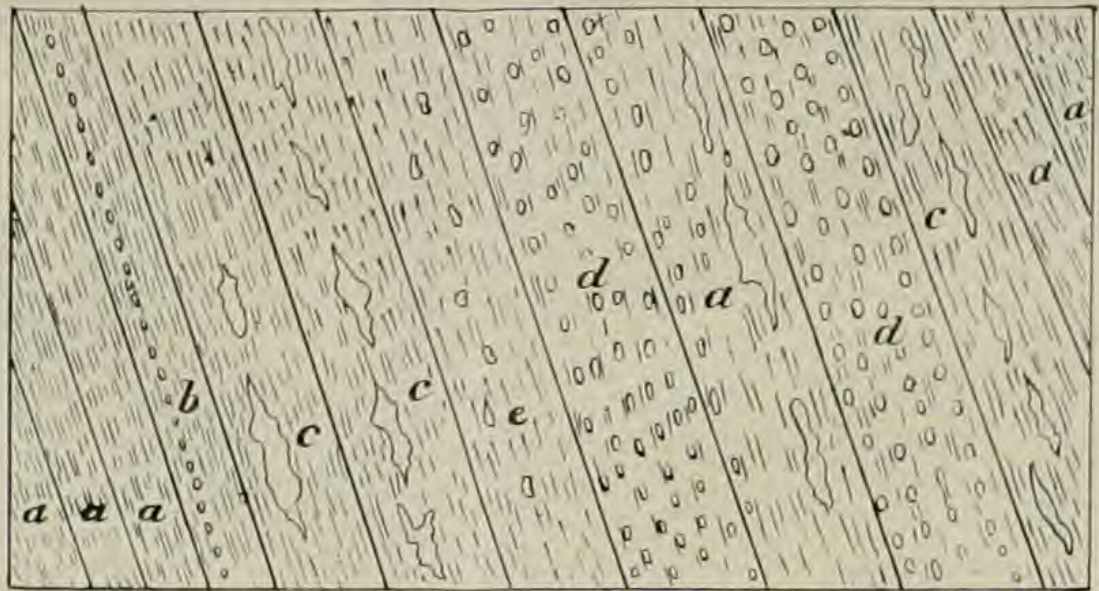
As we ascend the river from Maree, which must be done in a boat, as there is no road on either side, we meet with highly inclined strata of sandstone, with beds of boulders of quartz, granite, syenite, trap, &c. (Fig. I. *d.*) dipping under an angle of 30° to the N. by E; in

some places the boulders are six feet in diameter, and with their longest axis is always parallel to the dip of the strata. The same observation was made by Saussure in the Swiss Alps, where he observed conglomerates inclined, for the most part of an ovoidal-shape, and in the position mentioned. From this he inferred, and that too correctly, that such strata must have been formerly horizontal, each oval pebble having originally settled at the bottom of the water in this position. You sometimes meet the boulders, all of which are more or less smooth and rounded by attrition, lying in a different position from the one mentioned, which has been satisfactorily explained by supposing, that during their deposition they met with resistance, and the water therefore acting on them, gave them the position they now present; in other instances we meet with them arranged in single rows (Fig. 2. *b*,) or in beds alternating with the sandstone, or in only detached boulders (Fig. 1. *e*,) yet having the above position. In fact, if a similar action as that which raised the sandstone strata forming the banks of the Indus, were now to be called into action upon the bed of that river, we would have a similar arrangement presented, and as the boulders generally lie in a N. E. or N. by W. direction, we are entitled to infer, that the current by which they were deposited flowed from these quarters, and that afterwards by plutonian action, the beds were raised to the position they now hold.

The sandstone which is generally of a white grey or greenish grey colour, more seldom red, (but in these beds alternating with the grey varieties,) in many places is so soft as to crumble under the finger. In it we also meet with contemporaneous beds of quartz rock (*c*) pointing out shifts that abound all along the cliffs, (See Fig. 2.) The cliffs in general have mural faces rising to a height of two and three hundred feet, presenting a very bold and rugged appearance; about a coss above Maree their height is greatest, and decreases as we ascend. Cutting through these, innumerable deep ravines are seen, exposing well the structure of the rocks. In all those places where the river is hemmed in by banks, it is very rapid and deep, as at Mukud and Sharkee, &c. This department has been ably investigated by Lieut. Wood,* who devoted much time in surveying the river.

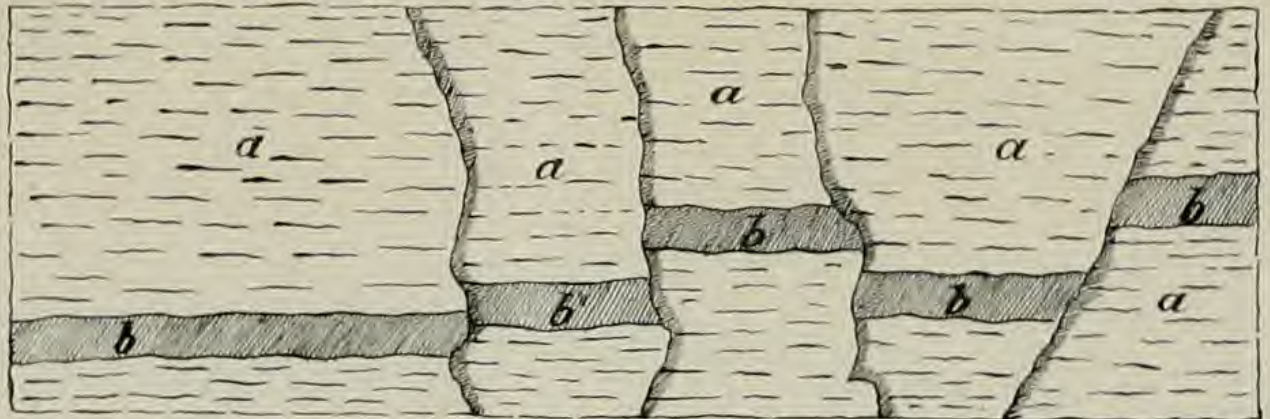
* Survey of the River Indus, Journal of the Asiatic Society.

Fig: 1.



- a Sandstone b. Sandstone with single row of boulders
c Imbedded quartz d. Bed of boulders e. Single boulders*

Fig: 2



a. a. sandstone bb. Quartz

*Sandstone Cliffs at Marce Dr Jameson's report on
the Geology of the Peninsula*

Quartz Rock.—The quartz rock occurs in various modifications, either in beds, veins, or amorphous masses; in colour generally white or greyish white, and it being much harder than the sandstone, it stands out in bold relief.

Scenery.—The scenery on the banks of the river is uniform in the extreme, nothing being presented to the eye but bare, barren rocks, and white sandy beds, rendered more so by efflorescences of rock salt from springs, which issue from the banks in great numbers.

Gold-washing.—Between Attock and Kalabágh, about three hundred individuals are engaged in washing the sand for the gold it contains, which occurs in small flattened grains. They go in parties of seven and eight, and use eight different kind of implements; 1. *large wooden trough* for receiving sand; 2. *pick* for removing stones to get at the sand; 3. *shovel*; 4. *sieve*. On it the sand is thrown and washed through into the large trough with water raised by 5. a *wooden scoop*, which prevents any stones entering the trough with the sand—6, 7 and 8 are different kinds of wooden vessels for receiving the sand after being properly washed. It is then carried to their houses and mixed with a little mercury which attracts the gold, and by exposing it to heat, the mercury is driven off again and the gold left, which is sold at the rate of sixteen rupees per tola—four drams. A fourth of this, however, is exacted by the Mallicks. The washers seldom realize more than four annas per diem, generally about three annas, the gold extracted per day varying from one to two mashas, which is equal to the twelfth part of a tola. The sand which yields the gold, being that left after the washing, has in general a deep black colour, and is obtained in greatest abundance immediately after the river falls. The variety of gold is the purest gold—yellow gold.

Having examined the country beyond Sharkee, and meeting with nothing but the sandstone, we returned to Kalabágh, in order to proceed to Peshawur via Shuckardurrah, Elrichi, &c. As Wood and Burnes had mentioned the existence of coal in this direction, and as no person had made a geological examination of the country, we were desirous to ascertain whether the carboniferous series was to be met with in this direction.

On crossing the river at Maree, we ascended the Gossai nullah, which during the cold weather contains but little water, and proceeded in a

N. N. W. direction. The strata met with consists of sandstone and red marl, highly inclined, dipping to the S. S. W. under an angle of 60° ; succeeding to these, we find the boulder sandstone, also highly inclined, dipping S. E. by E. and presenting the same kind of structure as already noticed. In it thin seams of coal occur, similar to that met at Kalabágh. The road leading along the bed of the nullah becomes so very contracted, as to allow nothing more than a single laden camel to proceed at a time, the banks on either side rising to a height of several hundred feet, and nothing being seen but the blue vault of heaven. The first halting place is Cutchee, distant six coss. Here there is a small village and a spring of fresh water, which is rarely met with in this district. We encamped in a field, being one of the few seen, the country being bare and barren in the extreme. The rocks around are the red marl and sandstone, inclining S. S. W. under an angle of 60° . On leaving the bed of the nullah, we ascended a small sandstone hill, over which the road runs, and from whence begins the range that separates the Cohat from the Peshawur valley. Teera or Khybur range is seen, bearing N. N. W. And we have also a fine view of the snow-clad mountains beyond Caubul. From it we descended into the Chuppi nullah, which is the boundary mark between the Kalabágh and Shuckardurrah estates. A short distance onwards is Chushmah, so named from a spring of fresh water occurring.

Chushmah.—Here we halted, owing to the rugged nature of the country over which we had come; though the distance was only seven coss, we did not reach the encamping ground till the afternoon, having started at ten A. M. From Chushmah, the country gradually becomes more cultivated; at first we only see here and there a cultivated field on the side of the mountain, and all around a barren waste, these by degree increased in number, till we meet with open and extensively cultivated valleys; and so with the road, it at first being through small and contracted nullahs, these opening and leading through plains, separating which, there are several rugged passes, difficult for camels. Close to Shuckardurrah, there is a high hill named Oukini,* in the country of Russool Khan, from whence salt is obtained, and yields to him a considerable revenue. On the banks of a

* Oukini Salt Mine.

small stream near to it, sandstone occurs jointed, the joints being at right angles to the seams of stratification. On leaving Shuckardurrah, the route lies along the bed of the Turali river, in which we have the following interesting section. (Fig. III.) The rocks dip almost due south under an angle of 80° , and as we proceed, we meet with red, green, and grey sandstones, with the same dip and angle of inclination; and resting upon them in an unconformable position there is an immense bed of clay, about seventy feet thick, filled with boulders of trap, quartz rock, granite, &c. These strata continued onwards till a little beyond Shebicki, where we meet with fossiliferous limestone, which forms all the strata in the neighbourhood of Cohat. In the centre of the valley, a diluvial conglomerate is here and there seen cropping out.

Separating the Cohat from the Peshawur valley we have the Teera or Khyber range, as already mentioned. It rises a little below the fort of Attock, from the right bank of the river Indus, and runs in a Westerly direction till it meets the Solimaun ridge, south of Suffeid Koh, increasing in height as it proceeds onwards.* The Pass is about 1500 feet in height, very rocky, rugged, and steep, and about two coss in length. The rock consists of the same fossiliferous limestone as that met with in the valley of Cohat, and dips under an angle of 55° to S. W. Whether this rock occurs at the Northern side of the Pass we were not able to ascertain, as, on reaching the summit, we were driven back by the Afreedees, with the loss of several of our followers.

Springs.—At Cohat, the springs supply so much water, as to irrigate the whole of Sultan Mohamad Khan's country, which is about seven coss in length; their temperature was 84° Fah.; early in the morning, that of the air being 34° Fah. We returned from Cohat via Toghan, Gummut and Pehar; the country in many places being very wild and mountainous, the rocks met with similar to those already noticed, and recrossed the Indus at Honshialghur, where the sandstone with boulders is still found forming the banks of the river. The sandstone is continued on to Futeh Jung, and is superceded half way between this place and Hussun Abdal, by a nummulitic limestone. At Hussun Abdal, the whole district is composed of compact limestone. There is—

* Elphinstone's Caubul, Vol. II. page 401.

a lake on the summit of a mountain 12,00 feet in height, to the N. of the town, and is visited both by Hindoo and Mussulman pilgrims, each assigning his own reason for the appearance of the water.* As to Cohat and other places already mentioned, we have large springs issuing from the limestone rock. In proceeding towards Peshawur, we again meet with alternations of sandstone and limestone till we arrive at Attock, when we find a dark bluish-black or reddish-brown clay slate, and cutting through it on the W. side of the river there are beds of trap (greenstone,) which lead to the supposition, that the slate, which has many of the characters of a transition slate, is nothing but a metamorphic slate clay of the saliferous series, altered by the action of heat. This supposition is strengthened by finding it associated with rocks belonging to this series. It dips to the S. under an angle of 35° to 55° .

Proceeding in a South-easterly direction from Hussun Abdal via Rawal Pindee, Manukeealla, Buckralla, and Rotus to Jehlum, we pass over strata first composed of limestone (magnesian,) succeeded by sandstone and red marl, which is well seen in the wild mountainous and rugged country extending from Buckralla to Kora, a distance of three coss, the route winding through a deep ravine, the mountains rising to a height of several hundred feet above it. The descent into this ravine is by a Pass, also several hundred feet in height, but which has been so levelled and formed by salient and re-entrant angles, as to allow a loaded camel either to proceed up or down. The rocks are red, green and white marls and sandstone, all highly inclined. On crossing the Jehlum, we pass over a few small hills, and composed of sandstone, probably of an age similar to that which contains the fossil organic remains found so well developed in the Sevalic range, between the Jumna and Sutledge, and from thence got into the open plain, the structure of which we have already noticed. With these remarks, we conclude our account of the Neptunian rocks, which form the strata of the salt range.

* By the Hindoos it is said that Baba Nanuck struck the rock, and made the water come forth. By the Mussulman it is said that on Mullah Allee Moortuzza, the brother of the prophet visiting this place, the mountain advanced to meet him ; on coming near to it, he ordered it to remain, and water issued forth from the place on which his hand rested, and several others. This happened about twelve hundred years ago !

Plutonian Rocks.—It is a remarkable fact, regarding the geological structure of this country, that though we meet every where, with the evidence of plutonian action in the disturbed, upraised, and altered state of the neptunian strata, there is only one locality where a plutonian rock is exposed; viz. at Attock. But probably the elevation of this range of mountains is connected with the great chain of the Hindoo Koosh. If so, it shews, that that system of mountains is as new as the saliferous series, and this is supported by the observations of Dr. Lord, who in company with Lieutenant Wood, ascended one of the highest Passes of that range.* That, however, plutonian action existed prior to the deposition of these strata, we are entitled to infer from the number and size of boulders, which are found imbedded in the sandstone strata, forming the banks of the river Indus, so that though the Hindoo Koosh, (which is a mere extension of the Himalayas, seeing that according to Humboldt they can be traced onwards to the volcanic Island of Formosa,) existed in the form of mountains; the position which it now presents was not attained till after the deposition of the saliferous series, and probably not till a later geological period, as we shall no doubt find many of the strata, which occur at the foot of the Himalayas, or among them, belonging to a much newer system; but to speak definitely, requires much further investigation, and at present we only can assert, that that range of mountains is newer than the saliferous series. Having now brought the first part of our report to a conclusion, it only remains for us to notice those individuals who assisted us in carrying on our investigation, to whom we are under great obligations. To Mr. G. Clerk, Governor General's Agent, we beg to return our best thanks. To him we are indebted for every thing. Through his interest and representation we received a most welcome reception at the court of Lahore, and means were put at our command of traversing the whole of his Highness Maharaja Shere Singh's dominions without molestation; and we cannot here pass unnoticed, the friendly reception that we every where met with in the Punjaub. When thrown into difficulties at Cohat, where I was obliged for sometime to take refuge in the fort of Sirdar Kadir Khan, Mr. Clerk again came forward with his assistance, and procured for me an escort of horse from his Highness the Maharaja.

* McClelland's Calcutta Journal of Natural History, No. 4, in which a notice of Lord's Geological Observations has been given.

To Captain Mackeson, Political Agent at Peshawur, we beg also to return our best thanks, for procuring for us, through General Avitabile, protection from the Cohat chiefs, and for his hospitable reception on our arrival at Peshawur.

(Signed,) W. JAMESON,

AMBALA, 28th June, 1842.

On Deputation on the Indus.

Barometrical Observations taken to ascertain the Altitude of the Station of Purulia, in the Ramghur District. By Capt. HANNYNGTON, 24th N. I. 1st Assistant to the Governor General's Agent, Maunbhoom.

In collecting the various documents relative to the Storm of 2nd and 3rd June 1842, which form the subject of my Seventh Memoir, I had occasion to solicit from Captain Hannington, to render his valuable report fully available for my purpose, the Barometrical correction for the difference of altitudes, and to obtain this more correctly, he requested me to obtain for him from Major Bedford, of the Surveyor General's Office, synchronous observations.

As every point of which the altitude can be thus determined, forms a valuable addition to our knowledge of the physical geography of India, I have requested Capt. H. to allow me to publish his results, which he modestly wished me to do in a foot note; but as it would much resemble putting a thing in the place least likely for it to be found when wanted, I have taken the liberty of making a separate, though brief, article of the observations, with his remarks.—H. PIDDINGTON.

The observations duly corrected were as follows:—

On 13th July, 1842.

	8 A. M.		10 A. M.			4 P. M.	
	Bar.	Ther.	Bar.	Ther.	Bar.	Ther.	
Calcutta, ...	29.493*	Alt. 81° Det. 79.6	29.526	Alt. 82° Det. 81.5	29.450	Alt. 83° Det. 82.7	
Purulia,	28.830	82° 80.0	28.835	83.5 81	28.795	84 82	

NOTE—The observations at Purulia at 2 P. M. could not be depended upon.

By Mr. F. Baily's formula, each pair of the observations separately calculated give

8 A. M.	Deduced altitude of Purulia,	...	...	663.62	feet
10 A. M.	Do.	...	..	694.23	,,
4. P. M.	Do.	...	..	659.59	,,
				<hr/>	
				Mean	672.48 ,,
				<hr/>	
	The Mean of the Observations gives	..	..	676.10	,,
				<hr/>	
	And the same by Hutton's method, ...	..	..	674.77	,,
				<hr/>	
				Final Mean	674.45 ,,
				<hr/>	

Hence we may suppose that Purulia is about 670 feet above Calcutta.

By reducing the Mean of the Barometers to the Mean Temperature at Calcutta, we have

Calcutta,	.....	29.496
Purulia,	.....	28.820
		<hr/>
Diff.	.....	0.676
		<hr/>

I suppose this may be taken for the Barometrical equivalent. Indeed, it appears that within moderate limits, and under similar temperature, the Barometrical difference $\times 1000 =$ the difference of altitude between any two places in feet. It agrees very closely in this instance. I have not seen the rule so simply stated, but it is nearly true, and for the plains of India perhaps sufficiently so. The logarithmic rule is, however, easy enough.

Brigadier TWEMLOW, on Artificial Fuel. Received from the Agricultural Society.

To the Secretary to the Agricultural and Horticultural Society of Calcutta.

Ellichpoor, 30th August, 1841.

SIR,—With reference to the notice contained in my letter of the 2nd instant, regarding clearing forest lands for cultivation, whilst making a substitute for coal, I have the honor to state, that this is a subject which I endeavoured to bring into notice so far back as the month of August of the year 1833, (copy of letter annexed.)

The following are some of the ingredients which might, I conceive, be mixed with charcoal, or inferior coals :—

1st. Bitumen, Pitch, and Tar, (obtained when burning the charcoal in inclined cylinders or furnaces.)

2nd. Oils, a small quantity of lime added to give packing consistency.

3rd. Gum Resins, extracts from Cactus and other Milky Plants and Trees, and Unctuous Clay.

4th. Seeds of Cotton ; Oil Plants ; refuse of Mills ; of Distilleries ; Fecula of Flax, Hemp, Indigo, &c.

5th. If the properties or smell of the above are objectionable, the mode adopted with success by the natives of India generally, for making charcoal fire balls for hookahs, by using the starch of rice or other grains might perhaps be the best, as most universally practicable.

Once made an article of commerce, the pressed charcoal, whether in bricks, balls, or blocks, would be brought to the coast by Binjurrâh Tandahs* going down to the coast for salt and other articles ; the turbulent hill tribes,† would without being aware of it, cut down their at present almost inaccessible forest dens of refuge ; and lands once covered with rich cultivation, such as those near the Taptee and other rivers, would again put on the garb of civilization, instead of being, as at present, the resort of the bison, the wild dog, sheep, and goat.

* Tandah, a community of Binjarrâh ; some having a thousand head of cattle.

† If the Bheel corps had each a company of Miners and Pioneers attached, discoveries, mineral and geological, would follow. The cave-making Ancients found their advantage in such excavations.

If it should be objected, that by exhausting the forests, the want of fuel would cause inconvenience, the reply would be, the more this is felt, the more search will be made, (and there can be no doubt with success,) for *coal*, of which nature in all probability has provided in India an ample supply.*

Search is making in Berar for coal. The sandstone,† indurated clay with fossils,‡ limestone, salt beds,§ give hope. The hills near Guwilghur, after rain, have the shining black sand (found wherever gold exists,)|| in all the courses for water on the laterite plateaus overlying the trap and basalt. The limestone is in ridges at the base of the hills to the south, and generally outside (though much intermixed with) the sandstone. The space between the outer ridge of limestone, and the inner of sandstone, would appear, with reference to its height above the valley of Berar, admirably adapted for lakes of irrigation or reservoirs to feed canals; but this is looking perhaps, too far forward.

I have the honor to be, Sir,

Your obedient humble servant,

GEORGE TWEMLOW, *Captain,*

Bengal Artillery.

COPY FORM LETTER BOOK.

To the Secretary to the Steam Committee, Bombay.

Aurungabad, 9th August, 1833.

SIR,—Permit me to suggest to the Committee, that in the event of “coal” not being procurable in sufficient abundance in India, an arti-

* When renewing the bund of the lake below the caves of Ellora, I had to dig very deep for foundation; an unctuous black mud deposit prevailed deep down, which would I conceive in course of ages, have assumed the consistency of coal. All the charcoal dust from the periodical burning of the hills had washed towards the bund, in all probability, and this mixed with fecula of fish, vegetables, &c. may have caused the appearance of the mud alluded to.

† The sandstone in all degrees of induration and cementation may be seen five miles North of the cantonment of Ellichpoor in contiguity with limestone and indurated clay; the sandstone distinctly stratified, but subverted as if heaved up.

‡ To be seen at Mokhtagherry, six miles North East of the cantonment of Ellichpoor.

§ Salt beds. Cattle thrive in Berar from the *salt* leeks. Salt is made rudely, by evaporation, at a village between Omrouttee and Ellichpoor.

|| Shining black ore, perhaps sulphuret of iron? Some of this has been sent in a letter to the Curator of the Museum of Economic Geology, to be tested. It was the common titaniferous Iron sand of India.—H. P.

ficial substitute for it might be made, where forests exist near the Coast, by mixing bitumen and pounded charcoal, (or in the interior of India cow-dung, clay and charcoal,) with a proportion of the unctuous mud used by the natives in making their "Ooplees."

The mixture to be moulded into the shape of *bricks*, and pressed by a powerful screw and lever, of a simple construction, into the smallest possible space, consistent with suitable ignition.

Refuse oil cakes might be a cheap substitute for bitumen. If this sort of brick should be found to answer, it might soon be made an article of commerce, and be prepared in every village, and in every Bin-jurrah camp within reach of the Coast; and the sooner to bring it about, natives might be deputed to make small advances, and to teach the mode of making the compound.

I have, &c.

(Signed) GEORGE TWEMLOW.

The same sent to Calcutta.

Refuse oil cakes called kullee, sell at Aurungabad at half rupee for 240 lb.—Charcoal 9 Rs. for 1600 lb.

The above is copied from Captain Twemlow's letter book; but the originals may somewhat differ, and the former materials possibly may not have been given in the letters.

The only object in sending this copy, of an old letter, is to remove any objection to interference with patents subsequently obtained for exclusive manufacture of artificial coal, whether in England or elsewhere. The "gool" makers of India have for ages made carboleine for hookas.

GEORGE TWEMLOW.

Ellichpoor, August 30, 1841.

Memorandum of 1841.

If the upper seams of coal of the present mines can be improved by admixture, this might lead to working to better coal. The water thrown up by Steam engines at the pits should be carried by channels of irrigation over land *owned by the Company working the mines.* A

terraced road to the nearest navigable river might be so constructed, as to answer in the *centre* for locomotive carriages, the *sides* for channels of irrigation. Steam engines at the heads of successive levels throw up water; the terrace in this way if occasionally submerged, would attain great hardness, in fact be silicified in course of time in all probability. All road-making should be done conjointly with facilities for water; the supply of the four months is ample for the twelve if retained, instead of being permitted to run waste, and carry off soil, filling up rivers.

A Companion to the Moon Table, by CAPT. SHORTREDE, 1st Assistant G. T. Survey.

In order to have the times of true as well as of mean, new and full moon, I have constructed the present as a companion to the moon table, by means of which the corrections to be applied may be found to be less than half an hour of the truth.

The term syzygy (the same radically as संयुग conjunction) being used to denote indifferently the conjunction of new or full moon, it is obvious, that as at a syzygy the moon must be in line with the earth and sun, the first correction of the mean to the true time will be that arising from the unequal apparent motion of the sun in its orbit depending on the sun's anomaly. This correction which at its maximum is about 10 minutes more than 4 hours, may be taken at once from the back of the card to within a few minutes of its true amount. As the anomalistic year exceeds the tropical by 25m. 07.2s. and the Julian by 13m. 58.8s., the relative position of the two circles on this card ought properly to be shifted by corresponding quantities, amounting to about 1 day in 57.3 years in N. S., or 103 years in O. S.; but as this can very easily be taken account of, I have thought it unnecessary to provide for it by a moveable card. If the moon table were provided with a vernier, or other means to admit of being read with certainty and ease to within an hour, it might be worth while to add here a moveable card; but for the present these considerations give way to convenience.

The following tables shew the position of the marks on the outer and inner circles (in half days,) for the Epoch, 1st January, 1800.

h. m.	+		---			1	6	11	16	21	26
0.00	00.00	27.50	27.50	55.00	January,	0.10	0.85	1.61	2.36	3.11	3.87
10	0.34	27.14	27.86	54.66	February,	4.77	5.52	6.27	7.03	7.78	8.54
20	0.69	26.78	28.22	54.31	March, ...	8.99	9.84	10.50	11.25	12.00	12.76
30	1.03	26.42	28.58	53.97	April,	13.66	14.41	15.17	15.92	16.67	17.43
40	1.38	26.06	28.94	53.62	May,	18.18	18.93	19.69	20.44	21.20	21.95
50	1.73	25.70	29.30	53.27	June,	22.85	25.61	24.36	25.11	25.87	26.62
1.00	2.08	25.33	29.67	52.92	July,	27.37	28.13	28.88	29.63	30.39	31.14
10	2.43	24.96	30.04	52.57	August, ...	32.05	32.80	33.55	34.30	35.06	35.81
20	2.79	24.59	30.41	52.22	September	36.72	37.47	38.22	38.98	39.73	40.48
30	3.16	24.21	30.79	51.84	October,...	41.24	41.99	42.74	43.50	44.25	45.00
40	3.53	23.82	31.18	51.47	November	45.91	46.66	47.41	48.17	48.92	49.67
50	3.91	23.43	31.57	51.09	December	50.43	51.18	51.93	52.68	53.44	54.19
2.00	4.29	23.03	31.97	50.71							
10	4.69	22.62	32.38	50.31							
20	5.10	22.19	32.81	49.90							
30	5.52	21.76	33.24	49.48							
40	5.96	21.30	33.70	49.04							
50	6.42	20.83	34.17	48.58							
3.00	6.90	20.33	34.67	48.10							
10	7.42	19.80	35.20	47.58							
20	7.98	19.23	35.77	47.02							
30	8.51	18.61	36.39	46.49							
40	9.26	17.92	37.08	45.74							
50	10.00	17.11	37.89	45.00							
4.00	11.05	15.07	38.93	43.95							
10	13.56	13.56	41.44	41.44							

The next correction, and the only other here requiring to be taken into account, is that depending on the moon's anomaly; and whether the mean or true anomaly be used matters little; that is to say, whether we use the mean time given by the moon table, or first apply the above correction; the latter mode, however, is the more proper to be followed.

The period of an anomalistic revolution is 27d. 13h. 18m. 35s., which (for reasons similar to those for the lunation) is here reckoned as 27½ anomaly days, each being 171.455s. of mean time longer than a solar day, which latter is 171.115s. of anomaly time short of an anomaly day.

In 13 revolutions of the anomaly, there are 358d. 5h. 01m. 35s. being short of a Julian year of 365¼ days by 7d. 0h. 58m. 25s. which may be called the Julian anomaly Epact. This being reduced at the rate of 171.115s. daily, becomes 7d. 0h. 38m. 20.25s. = 7d. 026623 = 14.053246 half days. The common and leap year Epacts may therefore be taken as 13.55325 and 15.55325 half days respectively, and their places on the outer card will be as in the annexed table. The

Year.	Place on the card.	Year.	Place on the card.	Year.	Place on the card.	Year.	Place on the card.
00	00.00	01	13.55	02	27.11	03	40.66
04	1.21	05	14.77	05	28.32	07	41.87
08	2.43	09	15.98	10	29.53	11	43.09
12	3.64	13	17.19	14	30.75	5	44.30
16	4.85	17	18.41	18	31.96	19	45.51
20	6.07	21	19.62	22	33.17	23	46.73
24	7.28	25	20.83	26	34.39	27	47.94
28	8.49	29	22.05	30	35.60	31	49.15
32	9.71	33	23.26	34	36.81	35	50.37
36	10.92	37	24.47	38	38.03	39	51.58
40	12.13	41	25.69	42	39.24	43	52.79
44	13.35	45	26.90	46	40.45	47	54.01
48	14.56	49	28.11	50	41.67	51	0.22
52	15.77	53	29.33	54	42.88	55	1.43
56	16.99	57	30.54	58	44.09	59	2.65
60	18.20	61	31.75	62	45.31	63	3.86
64	19.41	65	32.97	66	46.52	67	5.07
68	20.63	69	34.18	70	47.73	71	6.29
72	21.84	73	35.39	74	48.95	75	7.50
76	23.05	77	36.61	78	50.16	79	8.71
80	24.27	81	37.82	82	51.37	83	9.93
84	25.48	85	39.03	86	52.59	87	11.14
88	26.69	89	40.25	90	53.80	91	12.35
92	27.91	93	41.46	94	0.01	95	13.57
96	29.12	97	42.67	98	1.23	99	14.78
1.00	{ 28.33 30.33						14.78

double mark for leap year being inconvenient to put upon this card, is omitted ; its place is supplied by a double mark for January and February on the month card.

In 1325 anomalistic revolutions, there are 36509d. 19h. 22m. 55s., being less than a Gregorian century by 14d. 4h. 37m. 05s., and than a Julian by 15d. 4h. 37m. 05s. These centurial Epacts reduced as above, became in half days 28.329 and 30.325 respectively, or 28.33 and 30.33 nearly enough.

With regard to the position of the full century marks on the middle cards, we have

Moon's mean longitude on 1st January 1801, 111.36.42.1
 Mean longitude of moon's perigee do. 246.06.05.1
 ∴ Moon's mean anomaly on 1st January 1801, is 205.30.37

This corresponds to 15.7404 anomaly days past the perigee, which adding .0065 for the difference between Paris and Greenwich, gives 15.7469d.; and subtracting a common year Epact=6.777, we have 8.97d. for 1st January 1801, in civil time at Greenwich, or 17.94 half days as in the following table.

Cent.	N. S.	O. S.	B. C. or —	Cent.	N. S.	O. S.	B. C. or —
0	50.00	46.00	46.00	20	21.60	47.60	44.40
1	23.33	21.33	15.67	21	49.93	22.93	14.07
2	51.66	51.66	40.34	22	23.26	53.26	38.74
3	24.99	26.99	10.01	23	51.59	28.59	8.41
4	0.33	2.32	34.68	24	26.92	3.92	33.08
5	28.65	32.65	4.35	25	0.25	34.25	2.75
6	1.98	7.98	29.02	26	28.58	9.58	27.42
7	30.31	38.31	53.69	27	1.91	39.91	52.09
8	5.64	13.64	23.36	28	32.24	15.24	21.76
9	33.97	43.97	48.03	29	5.57	45.57	46.43
10	7.30	19.30	17.70	30	33.90	20.90	16.10
11	35.63	49.63	42.37	31	7.23	51.23	40.77
12	10.96	24.96	12.04	32	37.56	26.56	10.44
13	39.29	0.29	36.71	33	10.89	1.89	35.11
14	12.62	30.62	6.38	34	39.22	32.22	4.78
15	40.95	5.95	31.05	35	12.55	7.55	29.45
16	16.28	36.28	0.72	36	42.88	37.88	54.12
17	44.61	11.61	25.39	37	16.21	13.21	23.79
18	17.94	41.94	50.06	38	44.54	43.54	48.46
19	46.27	17.27	19.73	39	17.87	18.87	18.13
20	21.60	47.60	44.40	40	46.20	49.20	42.80

The hour marks on the inner circle of the middle Card stand thus—

H. M.	Place of mark on Card.			
	—	—	+	+
0.00	0.00	27.50	27.50	55.00
1.	0.96	26.66	28.34	54.04
2.	1.94	25.83	29.17	53.06
3.	2.94	24.96	30.04	52.06
4.	3.98	24.07	30.93	51.02
5.	5.05	23.12	31.88	49.95
6.	6.20	22.10	32.90	48.80
7.	7.46	21.01	33.99	47.54
8.	8.93	19.66	35.34	46.07
9.	10.73	17.89	37.11	44.27
9.48	14.33	14.33	40.67	40.67

The division lines and marks on the three cards being not continuous in these as in the week-day table, a silk thread is attached to them, in order to facilitate the bringing of the proper marks on the cards correctly into line. With the same view, the month marks have been projected on the circle separating the months and days. These marks are so small, as not to attract attention unless particularly looked for.

The method of using and manipulating these moon tables is so perfectly analogous to that formerly detailed for the week-day table, that beyond the directions on the face of the cards, nothing more seems necessary. An example or two may suffice. Required true time of full moon in October 1841, the 18 on the outer circle of the middle card being set to ●● on the outer, and the mark for October brought in line with that for the current year 41;

The month marks on the inner Card stand thus—

	Common.	Leap.
January,.....	0·00	2·00
February, ...	48·12	50·12
March,	47·24	
April,	40·36	
May,	45·48	
June,	28·00	
July,	23·72	
August,	16·84	
September, ..	5·96	
October,.....	5·08	
November, ..	43·20	
December, ..	42·32	

the full moon mark ○ falls almost exactly on the line between 29 and 30, hence the time of mean full moon is on the 30th at 0h. A. M. For this date, the back of the *Companion* gives 4.18h. to be *subtracted*: then for 1841 October, 29d. 8h. P. M. the face of the *Companion* gives 9.47h. to be *added*: the time of *true* full moon is thus the 30th at 5h. 29m. A. M. To which adding 5h. 54m. as the diff. of longitude between Greenwich and Calcutta, we get 30d. 11h. 23m. A. M. as the time at Calcutta. I have not at present the means of comparing with the Nautical Almanac, but the old tables, supposed to be Ferguson's, give 30d. 0h. 03m. 31s.* the difference being about 40 minutes.

An Eclipse of the sun is said to have been seen at Babylon in March 721, B. C.=8.80 O.S. Now 8, being set to ●●, and March in line to 80, mean new moon was about 20d. 2h. A. M. $\frac{721+1800}{103} = 24.5$, to which add 12 days for diff. of styles and 20th March+36 is 5th April, for which date the first Equation is +4.08m. and this applied to 20d. 6h. gives 20d. 6h. 08m. A. M. and for this date year 8.80, the *Companion* gives the 2d Equation +9h. 30m., and this gives the true time 20d. 3h., 38m. P. M., and adding 3h. for diff. of longitude, the time of new moon

* The Almanac in Rushton's work gives a day earlier by some mistake, which (or 12 hours) appears to run through every month of the year.



at Babylon in March 701, B. C. becomes 20d. 6h. 38m.; hence, to have been visible, the Eclipse must have happened at sun-set.

Required the day of full moon in March 1720, B. C.? The moon table gives at once 24d. 10h. A. M., and applying the Equations from the Companion, we find 24d. 7h. P. M. and 3h. for diff. of long. gives at Babylon 24d. 10h. P. M. It is therefore altogether a mistake to say, as is said in Rushton's work, that an Eclipse of the moon could have occurred on the 19th of March, 1720 B. C. Even had the date been correct, the moon was upwards of 65° from the node when full in March 1720 B. C., when of course an Eclipse was out of all possibility.

It is obvious that these tables may be useful in many cases to nautical men, who have occasion to know the time of high water at a port. They may be useful also to the traveller, who wishes to know when he will have moonlight. Europeans, who have occasion to know the common native date may find them of good use. Perhaps also the Joshis may find them useful in making their Almanacs, as the *Companion* with its principal will shew what तोथि are क्षय and what are आधिक more correctly, and with vastly less trouble than the methods now in use.

November, 1841.

Account of a luminous Meteor seen at Charka, lat. $24^\circ 06'$, long. $81^\circ 02'$. on the morning of the 11th April 1842, By CAPT. SHORTEDE, 1st Assistant G. T. Survey.

A little before 4 o'clock this morning, I saw a meteor of a singular appearance, of which the following is an account :—

I was lying awake outside my tent, and about a minute or two before had closed my eyes, intending to have a short sleep before marching, when my attention was roused by some brilliant light before me. On opening my eyes, I saw a meteor having very much the appearance of a rocket: it was situated in the constellation Scorpio, having its middle about 10° to the westward of Antares, and pointing towards the constellation Corvus, the lower star of which was about 4° above the horizon. The meteor was about 10° or 20° long, and equally bright

throughout, except at the upper end, where it was rather faint. It continued in the same position, and of the same brightness for between 2 and 3 minutes as well as I could judge, and then gradually became fainter and fainter, till it lost its brilliancy altogether: and as it began to fade, it began also to become crooked, and to move towards the west. It became gradually more crooked, and continued to fade till it became like a thin smoke, and at last vanished away at about 3° or 4° from the place where I first saw it. I listened attentively, but heard no noise. From the time I first saw it till its brilliancy ceased, was probably about 5 minutes, and in about 3 minutes more it ceased to be any longer remarkable.

I was then at Charka, in lat. $24^{\circ} 06'$ and long. $81^{\circ} 20'$.

Dewra, 11th April, 1842.

Analysis of Iron Ores from Tavoy and Mergui, and of Limestone from Mergui. By Dr. A. URE, London. Communicated for the Museum Economic Geology of India, by E. A. BLUNDELL, Esq. Commissioner, Tenasserim Provinces.

On the right bank of the Tavoy river, opposite the town of Tavoy, runs a range of low hills at a distance from the river varying from one and a half to three miles, formed apparently of magnetic iron ore. The range extends a distance of five or six miles. At about its Northern extremity, on the summit of a hill about 150 feet in height, is found the large projecting rock mentioned in page 28 of Dr. Helfer's Second Report. This rock is about one and a half mile distant in a direct line to the bank of the river, to a spot itself distant about three miles North of the town of Tavoy. This large rock is highly magnetic on its Northern side. (According to the expression of the natives, it is alive on its Northern and dead on its Southern side). The hill appears entirely formed of this ore, and at the bottom of it are to be found the rolled masses of from two to twenty lbs mentioned by Dr. Helfer. Between the hill and the river are rice fields, through which runs a small nullah, and having between the hill and the fields about quarter of a mile of high ground well adapted for buildings, and on which high ground are found the rolled masses or boulders above alluded to.

The nullah can convey boats of three to four tons, half way through the rice fields. The same description answers for the whole extent of the range of low iron hills, having here and there small nullahs, communicating with the river. This ore was once worked by the Burmese during the time of an expedition against Siam, for iron to make swords, knives, spears, and other weapons. People were sent from Ava to smelt it, but the process appears unknown to the Tavoyers. There are still to be seen the pits in which it was smelted, with the scoriæ around the edges. The quantity of the ore appears inexhaustible.

Limestone is procurable in the province, and no doubt many localities of it will be discovered. The only one yet properly ascertained exists about fifteen miles to the Eastward of Tavoy, accessible by water to within a distance of two miles by small boats of half ton burthen. Between the locality and the stream, the land is level and high, affording facility for a road. The quantity is abundant.

Charcoal may be made with ease, owing to the abundance of excellent wood in the country adapted to it.

No. 1.—Pieces of ore knocked off the large rock mentioned by Dr. Helfer, in page 28 of his Report.

No. 2.—Pieces of ore dug up in the neighbourhood of the above large rock.

No. 3.—Rolled masses of iron ore picked up on the high ground, between the hill and the rice field.

Mergui.—About 10 miles S. W. of the town of Mergui, is an island, comprising a hill about 200 feet in height, formed apparently of iron ore. The island is perfectly accessible to boats of every description, and you land on large masses of rock, which prove to be the iron ore from which the soil has been washed away. The hill rising abruptly from the water, may be about a mile in circumference, and is wholly formed of the ore, having a rich bed of soil. A similar island, equally accessible, is formed about four miles to the Southward of the one above mentioned. It is not known that this ore has ever been worked, and the process seems unknown to the people of Mergui.

Limestone is found in several accessible localities on the main branch of the Tenasserim river, not far above the old town of that name. Specimens accompany the iron ore.

No. 1.—Boulders of iron ore picked up at the landing place of the island above mentioned.

No. 2.—Pieces knocked off large masses at landing place.

No. 3.—Pieces dug up on the hill.

No. 4.—Specimens of limestone.

London, 13, Charlotte Street, Bedford, Square, 26th Nov. 1842.

I have now the pleasure of handing you the details of my examination and analysis of the several ores of iron and the limestones from Tavoy and Mergui, with which I have been almost constantly occupied during the last fortnight.

1st. Compact magnetic iron ore.—Tavoy, No. 1.

Colour iron black with a metallic glimmer, fracture fine grained, possesses magnetic polarity, specific gravity 3.511, compared to water = 1,000.

It yields in analysis the following constituents:

Peroxide of iron	...	...	...	86.5	equivalent to 60.55 metal.
Silica with a trace of phosphate	}	...	..	...	3.5
of lime,					
Water,	...	...	...	—	10.0
					100.0

It contains no manganese or titanium.

2d. Compact magnetic iron ore.—Tavoy, No. 4.

External and Magnetic characters as above.

Specific gravity, 3.462.

It yields in analysis:

Peroxide of iron	86.0	equal to 60.2 metal.
Silica with a trace of phosphate	}	...	..	...	0.9
of lime,						
Water,	...	...	...	...	13.1
					100.0	

It contains neither manganese nor titanium.

3d. Tavoy ore, No. 2.—External characters as above.

Specific gravity, 4.369.

4th. Tavoy ore, No. 3.—Characters as above, as to aspect and magnetism.

Specific gravity, 4.100.

The two latter samples are even richer than the former, as is evinced by the specific gravity, but they are all quite rich enough and pure enough for making the best quality of bar-iron and steel.

I instituted two elaborate sets of experiments in search of titanium, which when present in any notable quantity in iron ores, renders the iron made from them red-short, but I found none in the above ores. In the first set of experiments I treated the ore as follows: I added to its solution in nitro-muriatic acid, so much tartaric acid as to render all the oxides unprecipitable by ammonia. I next added ammonia in excess, and afterwards hydro-sulphuret of ammonia, which throws down all the metals except titanium. The whole being thrown upon a filter, afforded a colourless liquid which evaporated to dryness, and carefully ignited in a platinum cup, left no trace of titanous acid, which it would have done, had any of that metal existed in the ore.

The second set of experiments for titanium consisted in transmitting sulphuretted hydrogen in excess through the nitro-muriatic solution of the ore, in then adding ammonia in excess, the effect of which is to precipitate both the iron and titanium. But the precipitate when digested with sulphurous acid, has its iron dissolved, while the titanous acid will remain undissolved as a white powder. By this means also no distinct evidence of titanium could be obtained.

5th.—The limestone from Tavoy has a specific gravity of 2.7, and is a perfectly pure, semi-crystalline carbonate of lime, akin to statuary marble. It is well adapted to act as a flux in the smelting of iron.

The three samples of iron ores from Mergui, are brown hematites, and from their density, will afford good iron in the smelting furnace.

6—Mergui iron stone No. 1 specific gravity 3.37.

7	Ditto.	Ditto.	2	Ditto.	3.18.
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8	Ditto.	Ditto.	3	Ditto.	3.32.
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The limestone of Mergui has a specific gravity of 2.7; it is a pure calcareous carbonate. I analyzed both the limestones.

I am, dear Sir,

Yours truly,

(Signed)

ANDREW URE.

Supplement to the Monograph of the Indian and Malayan species of Cuculidæ, or Birds of the Cuckoo family, published in Vol. XI, pp. 898, 1095, et seq. By EDWARD BLYTH, Curator of the Asiatic Society.

Having received some annotations on my paper on *Cuculidæ* from Mr. Jerdon, and been favoured by Dr. McClelland with the loan of the *Zoologie du Voyage de M. Bélanger*, which has set me right with regard to the names of certain species, besides furnishing some other information concerning them, and having likewise learned one or two other facts worthy of publication, I shall not longer postpone the preparation of an Appendix to that paper, but proceed at once to its revision.

ACCIPITRINE CUCKOO; *Cuculus sparverioides*, Vigors and Gould. In Southern India, writes Mr. Jerdon, this species is "only found in the dense woods of the summit of the Neilgherries. It is seldom seen except when the woods are beaten for Woodcocks, and quits the shelter of the wood with reluctance. I never heard its note. Flight rapid. Stomach filled with caterpillars."

WHISTLING CUCKOO; *C. fugax*, Horsfield. The same observer continues — "Besides the Hindustani name given in my catalogue, its name in Telooogo is *Kuttee pitta*, i. e. 'Sword-bird,' given, it is said, from its peculiar and rapid flight. It is stated by the Shikarees to deposit its eggs in the nest of the Shikra! (*Astur Dussumieri*), which it so much resembles in colour. In the Deccan it is sometimes named *Zuk-kat* or 'Custom-house bird.'" In Bengal, the young of this bird are far more numerous in open jungles than the Hawk mentioned, but I have not yet observed any particular species feeding them.*

C. Sonneratii. "Only found in dense forest-jungle." Jerdon.

C. niger. "Dispersed over all the peninsula wherever there is much shelter. At Hydrabad I saw one of this kind in the grey plumage sitting on a trellis work in a garden expanding its wings continually, and close to the spot where it sat and within view was a nest of *Prinia socialis* containing two eggs, which I recognised to be those of that bird. It struck me at the time that the little Cuckoo had made the discovery of the nest, and was meditating the substitution of her own

* A young specimen of apparently this bird from Macao is very much deeper-coloured than usual, and may possibly be of a different species.

egg. I suspect, therefore, that the rufous specimens are young, and that the female does not differ so materially from her mate. Besides the usual plaintive note, this species has also a cry almost exactly like that of the *C. fugax*, though of course much subdued and repeated faster. It is certainly the *C. flavus* apud Lesson (*Traité*), said to be from Bengal."—*Ibid.*

C. flavus. In the *Zoologie du Voyage de M. Bélanger*, M. Lesson confounds, I am much inclined to suspect, at least three species under this name; viz. the Indian *niger*, the Malayan *flavus*, and the Australian *cineraceus* (figured by Messrs. Jardine and Selby, *Ill. Orn.*, pl. LXVII), stating that it appears to inhabit all the isles of Sunda, Bengal, the Phillipines, Port Jackson, and Van-Diemen's Land. "A veritable Proteus," he remarks, "this little Cuckoo seems indifferently to assume several phases of plumage, according to what island of the Indian Ocean it inhabits; at least unless a plurality of species be confounded under the same name, which differ from each other only by very indistinct and uncharacteristic shades of diversity. Buffon, or rather Daubenton, has figured by the name of *le Petit Coucou de l'Isle de Panay*, *Enluminure* 814, one type corresponding to the bird which M. Bélanger has brought from Java, where it had previously been met with by MM. Labillardière and Leschenault. *Sir Raffles* mentions it in his catalogue as occurring in Pulo Penang, and Dr. Horsfield informs us that it is the *Gedasse* of the Javanese." This Malayan bird (which alone I apprehend to be the true *flavus*) is described as follows:—

"*Le Coucou à tête grise*, de Java, here described, is seven inches and a half (French) long. Its bill is blackish; the tarsi yellow. The head, cheeks, throat, and sides of the neck, are frosty-grey (*gris glacé*); a lustrous and silky bronze-brown, with tolerably bright (*doux*) reflections, prevails on the back and wings, a dark ashy tint on the croup, and russet on the quills. All the lower-parts of the body are russet (or ferruginous, *roux*), or tolerably vivid blonde. The middle tail-feathers are uniformly bronzed brown above; the lateral ones are brown marked (*frangées*) with white: underneath all of them are brown rayed with white, purer and more distinctly on the margins. A similar individual exists in the Paris museum, brought, according to Leseur, from the Straits of Entrecasteaux."

Others from the various localities before cited "offer, upon examination, altogether the same characters, though we are compelled to recognise varieties of race, both according to size and the disposition of the colours of the plumage."

The Australian race (*C. cineraceus*, Vigors and Horsfield, *Lin. Trans.* XV, 298; *Barred-tailed Cuckoo* of Latham, *Gen. Hist.* III, 310;), if the figure of it in Messrs. Jardine and Selby's *Illustrations of Ornithology* (pl. LXVII) be correctly coloured, would seem to have the under-parts much deeper rufous than I have ever seen in Indian specimens, and the tail-feathers more broadly and conspicuously margined laterally with white. The following description is attached: — "The length of most specimens seems to be from nine to eleven inches. The upper-part of the plumage is a dull bluish-grey, on the wings tinged with brown, upon the tail nearly black; the throat is pale blue-grey, the rest of the under-parts reddish ochre-yellow, palest on the belly and vent; the inner webs of the quills are marked with white, which forms a diagonal bar across the under surface; the tail, with the exception of the centre-feathers, is deeply dentated with narrow white markings, which gives it nearly a barred appearance when expanded. The feet and legs appear to have been yellow. The females are generally duller in their colourings, and have the under-parts transversely barred with dull bluish-black. The young of the first year are dull umbre brown, with transverse darker markings."

The Indian bird appears to be typically dark grey without any rufous, at least the old male, and according to Mr. Jerdon's observation cited, some perhaps of the old females; but the ordinary dress of the adult female is, I suspect, as I have described it, namely, a garb corresponding to that so generally assumed by *C. poliocephalus* (*Himalayanus* of Vigors and Gould), and constituting the *hepaticus* variety of *C. canorus*: upon the first moult, the males appear generally to have the lower parts from the breast rufous, but rarely the upper part of the breast and fore-neck (as in the figure cited of the Australian *C. cineraceus*), indeed I have only seen one specimen thus characterized, and in this the colours of the entire under-parts are unusually dull and have some faint cross-striæ, indicative probably of a weakly individual. These states of plumage, together with the first or nestling dress, I have before minutely described.

It should be remarked, that I have seen no Indian specimen corresponding to the original description of *C. flavus* by Sonnerat and Daubenton, which would seem to have been unusually pale, having the "upper part of the head and throat light grey; the nape, back, and wings, pale umbre-brown; and the belly, thighs, and lower tail-coverts, pale yellow tinged with russet." The *C. rufivittatus*, Drapiez, may be presumed to refer to *C. flavus* in one or rather two of its phases; and his *C. pyrogaster* to one of these three species, if they be different. The latter point can only be decided by actual comparison of a number of specimens of each of them, and which way the probability lies cannot be suggested, as the Malayan *C. lugubris* is certainly distinct from the Indian *C. dicruroides*, though most closely allied to it, while *C. (Eudynamys) orientalis* spreads from India and China* through the countries of the Indian Ocean into Australia,—*C. (Chrysococcyx) lucidus* is common to the two latter regions,—various other species to India and the Malay countries, and others again to India and Africa. *C. canorus* extends over Europe, Asia, and Africa, spreading southward (according to Dr. Horsfield) into Java, where however it would appear to be rare, and it is not quite clear that *C. micropterus* has not there been mistaken for it: certainly, however, I believe, (so far as has been yet observed,) its distribution does not reach into Australia.

The present group of small Cuckoos with naked tarsi, and further characterized by a particular type of colouring in all its varieties, appears to me to be fully as much entitled to subgeneric distinction, if not more so, than those of the Metalline Cuckoo (*Chrysococcyx*) and the Drongo Cuckoos (*Pseudornis*, Hodgson); and I suspect that *C. honoratus* should be referred to it. M. Lesson assigns the *C. flavus* to his *Surniculus*, which he founds upon *C. lugubris*†; thus mingling two very distinct subgenera, which must be acknowledged separately if either be systematically distinguished from the

* The Society has just received specimens of both sexes from Macao.

† In Mr. G. R. Gray's List of the Genera of Birds, 1st edit. p. 57, *Surniculus* of Lesson is put as a synonym of *Eudynamys*; but erroneously, according to M. Lesson in the work here cited, where he remarks—"Le Coucoul ugubre est pour nous le type d'un petit sous-genre qui semble confiné dans les îles de l'Est," &c.—*Zoologie du Voyage de M. Bélanger*, p. 236.

other subgenera of restricted *Cuculus* : and if he had not so expressly selected *C. lugubris* as the type of his *Surniculus*, it would have been convenient to have reserved this name for the present form, retaining Mr. Hodgson's *Pseudornis* for the Drongo Cuckoos; but such an arrangement would not be sanctioned by Zoologists, and it remains, therefore, to propose a distinctive appellation for the subgenus under consideration, which accordingly may be termed *Polyphasia*, allusive to the numerous variations of plumage assumed by the species.

Subgenus *Surniculus*; Lesson, 1834; *Pseudornis*, Hodgson: the DRONGO CUCKOOS. According to Mr. Hodgson, the sexes of *C. dicruroides* are similar; and such I believe also to be the case with those of *C. lugubris*, and that the Javanese specimen described by M. Lesson as the female of the latter must therefore be the young. "Length nine inches (French), of which the tail occupies five inches: bill black, and tarsi brown. The feathers around the beak tinged with rufous; those of the upper-parts are brown, with a steel-blue reflection deeper on the wings and tail; a number of small and round white specks, encircled with black, are sprinkled over the head, shoulders, and wings; all the under-parts of the body are brown, tinged with rufous on the fore-part of the neck, and sprinkled with small whitish round spots; the posterior tibial feathers incline to be whitish; wings brown, varied with white internally about the shoulder, and elsewhere on their under-surface they are brown, having a white ray; tail brown underneath, barred with whitish on its small feathers only."

Since the publication of my Monograph of Eastern *Cuculidæ*, I have received a second Singapore specimen of *C. lugubris*, which resembles that which I formerly described in its dimensions, and is merely somewhat brighter black, with no white specks whatever on its upper surface, and very few (and those but faint and confined to the abdomen) below; the exterior short pair of tail feathers are rather longer. It is not improbably a male, while the other may be presumed to be a female; and it may be added, that the conspicuous white occipital spot of the other specimen does not occur. The same difference is observable in two very fine specimens of *C. dicruroides* with which I have also been kindly favoured; and it is remarkable that these have the tail no more furcate than in *C. lugubris*, while their dimensions correspond with those of Mr. Hodgson's Nepâlese examples. The

length of the wing affords a ready distinction between these two closely allied species, being in both specimens of *lugubris* but four inches and three-quarters, while in six specimens of *dicruroides* before me it averages five inches and a half (a mere trifle more or less).

Subgenus *Chrysococcyx*. There is a *Iampromorpha* *amethystina* described by Vigor in *P. Z. S.* 1831, p. 98, from Manilla; but it does not appear in what it differs from *Chr. xanclorhynchos*.

Eudynamys orientalis: the COËL. I am indebted to Mr. Frith for an egg of this species, found in the nest of *Corvus macrorhynchos*, together with one egg of that species. As the egg of *Cuculus canorus* bears a general resemblance in colour to those of the small ground-building birds in the nests of which it is most frequently deposited, so does the Coël's egg bear a marvellous resemblance to that of the Crow, being, however, much smaller. The specimen measures an inch and a half in length, and its colour is slightly bluish olive-green, rather pale than otherwise, with numerous reddish-brown spots (much as in some Blackbirds' eggs), and an indistinct zone of these near the large end. Mr. Frith has never found more than one Coël's egg in a nest, and has only met with it in those of the two Indian Crows. He has repeatedly seen the common Crow (*Corvus splendens*) attack and drive off the female Coël from its neighbourhood, and in one instance observed the latter, while trying to escape the pursuit, dash itself against a pane of glass in an out-house with so much force as to fall dead from the injury it received, the bill and fore-part of the head being quite smashed. I may add that the young nestling Coël, more especially the male, bears no small resemblance to a young Crow, *i. e.* a black one.

Oxylophus Coromandus: RED-WINGED CRESTED CUCKOO. Mr. Jerdon has seen specimens of this bird from the forests of Malabar.

O. edolius: PIED CRESTED CUCKOO. Of this species, the same naturalist has "obtained one young bird in the nest of *Malacocercus griseus*, in a thick hedge in Coimbatour. It has a loud peculiar call, which it only appears to utter when on the wing. In Telegoo it is called *Gollee kokeelah*, or 'Milkman Cuckoo,' it being said to call '*Gollee Gollee*,' and when pronounced gutturally, these words have not at all a distant resemblance to its cry." Dr. Buchanan Hamilton also obtained the egg of this species in the nest of a *Malacocercus*, and figures it of a spotless blue colour, as is also the egg of its dupe; and

he states that this bird only visits Bengal during the rainy season, in which he appears to be correct.

Genus *Rhinortha*, Vigors; *Anadænus*, Swainson; also *Bubutus*, Lesson. In the Zoology of M. Bélanger's *Voyage*, M. Lesson has figured the *Rh. rufescens* of my monograph as *B. Isidori*, whilst his description of the latter refers to *Rh. chlorophæa* (*Cuculus chlorophæus*, Raffles, &c.); and by the name *B. Duvaucelii*, citing his *Ornithologie*, p. 143, (or *Cuculus Sumatrensis* of the Paris Museum, not *C. Sumatranus*, Raffles,) he has given a description which probably refers to my *rufescens*, though I cannot understand what is meant by the italicised portion of the following quotation, which alone does not apply — "Cet Oiseau, de la taille du Coucou Edolio, a le bec jaune, la tête d'un cendré blanchâtre, le plumage gris cendré, les ailles rouses, l'abdomen et la region anale d'un rouge ochreux," &c. If it be intended that *the back* is coloured ash-grey, then probably M. Lesson's species is distinct. But it must be remembered that his description and plate of *B. Isidori* refer to different species, as before mentioned.

The *Phænicophæus longicaudatus* of my monograph is M. Lesson's *Melias tristis*, and may rank therefore as *Ph. tristis*, unless it be considered worth while to separate the small-billed species from the others: and my *Ph. tristis* appears to be M. Lesson's *M. Diardi*, of which he states that it resembles the former species in its form and colouring, but is only half the size, and presents some other differences; this bird is the *Cuculus Sumatranus* of Raffles, and must rank, I therefore presume, as *Ph. Sumatranus*. I am assured by Mr. Frith that this latter species occurs in the Soonderbuns of Bengal, and that the other is common on the hill ranges of Assam.

Ph. Jerdoni is "termed in Hindustani *Kuppra Popya*, and in Teloogoo *Wamaneh okee*."—Jerdon.

Zanclostomus Sirkee is "called *Jungle Parrot*, both in Hindustani and Teloogoo, from its red bill."—*Ibid.*

Centropus Phillipensis "builds a very large nest in some thick bush or hedge, and lays two or three greenish-blue eggs. This I have on the authority of an excellent *Shikaree*. It occasionally pilfers eggs from the nests of other birds."—*Ibid.* When running up the bough of a tree, which it does with remarkable celerity, it often throws the tail up over the back.

C. Sinensis : *Polophilus Sinensis*, Shaw's *Zoology*, IX, 51. In my Monograph I referred this, with a note of doubt, to *C. Phillipensis*, but have since received the species from Chinghai, and it is closely allied to *C. lepidus*, but as large as *C. Phillipensis*, being very obviously distinct from both. Length about nineteen inches, of which the tail measures eleven inches, its outermost feathers four inches and a half less; wing seven inches and a half; and beak, which is much curved and robust, an inch and five-eighths to gape. Colouring much as in *C. lepidus*, but the head, neck, interscapularies, and under-parts, are considerably darker: the nape and interscapularies are dusky with whitish shafts, terminating in yellowish-white rigid and almost prickly tips; head browner, with shining dark shafts to the frontal plumes: the under-parts dingy-whitish, with dusky cross-bars on each feather, and also rigid yellowish-white tips, more particularly to the feathers of the throat and breast: scapularies dingy rufous; the wings brighter rufous, with nearly obsolete dark bars on their smaller coverts; the greater coverts, with the primaries, secondaries, and tertiaries, being in course of renewal, and those newly put forth are spotless rufous, whilst the unshed are barred with dusky: rump blackish; the tail and its upper coverts the same, barred with numerous whitish cross-rays: beak dusky-black, whitish along the edges of the mandibles and towards the tip of the under one; feet also blackish; and irides stated to be light horn, or coloured like the wings, though in the fully mature birds I presume they would be crimson.

“*C. Bengalensis* of my Supplement may be *C. lepidus*.”—Jerdon.

*Proceedings of the Asiatic Society.**(Friday Evening, 30th March, 1843.)*

The usual monthly Meeting was held on Friday evening the 3rd March 1843, the Hon'ble Sir J. P. GRANT, V. P. in the Chair.

Read the following memorandum circulated to the Committee of Papers by the Acting Secretary, with the usual reference respecting the proposed admission of Professor JULES MOHL of Paris, as an Honorary Member.

“This honour is solicited for Professor MOHL, by our associate and most zealous Agent at Paris, Major TROYER.

The Professor is well known as one of the most distinguished Oriental Scholars in Europe, and as Secretary to the Societé Asiatique de Paris. He has also been for years a steady correspondent and a liberal contributor to our Library, and the warm friend of every Oriental Scholar visiting Paris; as well as, with Major TROYER, an active friend to our interests whenever they could serve them.”

H. PIDDINGTON,
Acting Secretary Asiatic Society.

The report of the Committee being unanimously in favour of Professor Mohl's nomination, he was therefore duly elected.

Dr. TRANter, Nizam's Contingent, was also duly elected, and the usual communications were ordered to be made to these gentlemen. The following gentlemen were proposed as Members:—

The Hon'ble Sir LAWRENCE PEEL, Chief Justice of Bengal, and W. SETON KARR, Esq. B. C. S. both proposed by Sir J. P. GRANT, and seconded by Sir H. SETON.

Read, extract from the Proceedings of February, announcing the intention of the Hon'ble H. T. PRINSEP, to vacate the Chair of the Society in consequence of his departure for Europe.

Read the following letter from him, addressed to the Acting Secretary.

H. PIDDINGTON, Esq.

Offg. Secretary Asiatic Society.

SIR,—As the period is now just approaching for my departure from India, I think it necessary to place in your hands my resignation of the office of President of the Asiatic Society, and to request that you will lay it before the Committee of Papers, to be by them communicated to the General Meeting of next month.

I have the honor to be, Sir,

Your very obedient humble servant,

Calcutta, Friday, 18th February, 1843.

H. T. PRINSEP.

Read the following Minutes of a Special Meeting of the Committee of Papers, held at the Society's Rooms, on Thursday, 23rd February.

Thursday, 23d February, 1843.

At a Special Meeting of the Committee of Papers,

PRESENT.

The Honorable Sir H. SETON,
Lieut. Colonel FORBES,
CHARLES HUFFNAGLE, Esq., and
The Acting Secretary,

Read the letter of the Honorable H. T. PRINSEP, resigning the chair of the Society.

1. Resolved.—That it be recommended to the Society, that a letter be addressed to the Honorable H. T. PRINSEP, expressing the deep regret of its members for the loss of his valuable aid, and their hope, that he would continue to forward the interests of the Society in Europe.

2. That it be farther recommended to the Society to request that its late President do oblige us by sitting for his Portrait (of Kit-Cat size,) and that a subscription be opened to defray the expence.

3. That it be farther recommended to the Society to request, that the Right Honorable W. W. BIRD, will be pleased to accept the President's chair.

The Honorable W. W. BIRD was unanimously elected President of the Society.

Read the following draft of a letter to be addressed to the Honourable H. T. PRINSEP:—

HONOURABLE SIR,—The Asiatic Society of Bengal has learnt with deep regret your resignation of its chair; a loss to its interests and to those of Oriental science and literature which it feels will not be easily repaired.

For its members fail not to recollect, Sir, at such a time, with how much zeal and perseverance, and for how many years, and even when pressed with the weight of official duties of the highest responsibility, you have devoted yourself, with untiring energy, to the pursuits of the scholar, the patient researches of the antiquary, and the minute and laborious investigations of the geographer and the historian, and what the fruits of these constant labours have been. Nor can they omit to mention, Sir, that you have ever been found the strenuous and able advocate of oriental literature, the generous and worthy associate and emulator of many of the great men whose labours adorn its annals and the records of their Society, and the kind and discerning patron of the humblest labourer in these and in many other fields: adding thus a lustre to the honoured name which you bear, and leaving to their Society the grateful duty of again enrolling that name amongst those of which it is so truly and so justly proud.

Deeply then, Sir, must the Asiatic Society regret the loss of one who has so much contributed to its advancement and to its reputation; but this regret is tempered by the confident hope which it now ventures to express, that, as the field which awaits you in Europe is not less a great, a noble, and an eminently useful one, you will still continue the same steady friend to the interests of Indian literature and science, which you have heretofore been.

Anxious, Sir, to possess some memorial of you, they now request that you will be pleased on your arrival to sit for your Portrait, which they are desirous of placing by the side of those of your predecessors in the Presidentship of the Society.

In conclusion. They beg to assure you, Sir, of their unfeigned respect, and to offer to you their best wishes for your future health and prosperity.

By order of the Society,

Asiatic Society's Rooms, 4th February, 1843. (Signed) H. PIDDINGTON,
Acting Secretary Asiatic Society.

It was ordered—That the letter be signed by the Acting Secretary on the part of the Society, as had been done in former cases, (Presidents COLEBROOKE and HARRINGTON,) and agreed upon, that a deputation consisting of the Committee of Papers, and of such members as might please to attend, should meet at the Rooms, at ten o'clock the following morning, for the purpose of waiting on the Honourable Mr. PRINSEP with the letter, and from thence proceed to Government House, to notify to the Honourable Mr. BIRD, his election as President.

The following list of Books presented and purchased was read :—

LIBRARY.

- Books received for the Meeting of the Asiatic Society, on the 3rd March, 1843.*
- The Calcutta Christian Observer, March, 1843, new series, vol. iv. No. 39.—Presented by the Editor.
- Journal of the Bombay Branch of the Royal Asiatic Society, No. 4, April, 1842.
- Journal des Savans. Paris, Aout, 1842.
- Journal Asiatique, 3me serie. Paris. Avril, Mai, Juin, 1842, Nos. 73, 74, and 75, tome xiii.—Presented by the Society.
- Proceedings of the American Philosophical Society, 1841-42, vol. ii, Nos. 18 to 22.
- Transactions of the American Philosophical Society, new series. Philadelphia, 1841, vol. viii, part i.—Presented by the Society.
- The London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science, 3rd series. London, September, 1842, vol. xxi, No. 137.
- Report of a Committee of the British Association for the advancement of Science, pamphlet.—Presented by the Society.
- Meteorological Register kept at the Surveyor General's Office, Calcutta, for the month of January, 1843.—From the Surveyor General's Office.
- Fonceux, Discours prononcé a l'ouverture du cours de Langue et de Literature Tibetaine, prés la Bibliotheque Royale. Paris, 1842, pamphlet.—Presented by the Author.
- Fonceux, (Le sage et le fou.) Extrait du Kan — Jour. Paris, 1842. pamphlet.—Presented by the Editor.
- Julien, Exercices pratiques d'Analyse de Syntaxe et de Lexicographie Chinoise. Paris, 1842, 8vo.
- Darwin's Journal of Researches into the Geology and Natural History of the various countries visited by H. M. S. *Beagle*. London, 1839, 8vo.—Purchased.
- Offrande au Dieu de L'Univers, par A. Fabius. Lyon, 1842, pamphlet.
- The Oriental Christian Spectator, 2nd series. Bombay, August, 1842, vol. iii, No. 8.—Presented by the Editor.
- Royle on the Production of Isinglass along the Coasts of India, with a Notice of its Fisheries. London, 1842, pamphlets, two copies. Presented by the Author.

The Acting Secretary informed the Meeting, that the sum of Rs. 76 : 10 : 3 having been paid as import duty on Professor Mill's Bust, (to clear it from the Custom House pending the application) he had applied to the Collector of Customs for a refund of this amount, which upon his favourable report to Government, was duly ordered and paid.

Read the following letter from the Officiating Secretary to Government of India, Military Department :—

No. 285.

To the Secretary to the Asiatic Society.

Military Department.

SIR,—I am directed to acknowledge the receipt of your letter of the 24th November last, and in reply to transmit to you, for the information of the Asiatic Society, a Copy of the Surveyor General's Despatch, No. 36, dated 13th August 1842, the original of which was recalled by an Office Memo. of the 5th December last.

2. The Surveyor General of India, with whom it may be expedient you should communicate on the subject of printing the Report upon the operations for measuring an Arc of the Meridian carried through the centre of the Peninsula to the Northern confines of Hindoostan, has received instructions to take the necessary steps to ensure the proper publication of the Report in the Researches of the Asiatic Society.

I am, Sir,

Your most obedient servant,
W. M. N. STURT, Major,
*Officiating Secretary to the Government
of India, Military Department.*

Council Chamber, 17th February 1843.

And from the Secretary to Government, General Department.

No. 21, OF 1843.

From G. A. BUSHBY, Esq., *Officiating Secretary to the Government of India*, to H. PIDDINGTON, Esq., *Acting Secretary to the Asiatic Society, Fort William*, the 15th February, 1843.

Political Department

SIR,—In acknowledging the receipt of your letter dated 22nd ultimo, I am directed to inform you, that His Honor the President in Council will be glad to have from the Asiatic Society, a few lithographed copies of the Inscription received from Aden, for the use of the Hon'ble the Court of Directors.

I have the honor to be, Sir,

Your most obedient Servant,
G. A. BUSHBY,
Officiating Secretary to the Government of India.

Fort William, 15th February, 1843.

From Secretary to the Government India.

From Officiating Secretary to the Government of India, to H. PIDDINGTON, Esq., Acting Secretary Asiatic Society, dated Council Chamber, 17th February, 1843.

Revenue Department.

SIR,—The Hon'ble the President in Council having reason to believe, that the attention of the Asiatic Society of Bengal has been directed to the subject of the Nurmah Cotton, I am desired by His Honor in Council to transmit to you, for the information of the Society, and for publication in its Journal, the accompanying copy of a dispatch, No. 4013, dated the 31st December last, from the Secretary to the Government, North-west Provinces, containing particulars on the subject.*

I have the honor to be, Sir,

Your most obedient Servant,

FRED. JAS. HALLIDAY,

Officiating Secretary to the Government of India.

Read letter from the Secretary to the American Philosophical Society, acknowledging the receipt of the Journal of the Society, No. 22 to 29, new series.

Read the following extracts from a private letter from M. EUGENE BURNOUF, of Paris, to the address of the late Secretary, which as testifying the high degree of estimation in which the Society's Transactions and Journal are held at home, will be found of interest to its friends and supporters in India.

“Ce sera une chose bien honorable pour la Société dont vous êtes le digne organe, d'ajouter un volume nouveau aux nombreux et beaux volumes qu'elle à déjà publiés, les derniers, notamment, ont été particulièrement distingués entre tous, à cause de la richesse et de la nouveauté des matières qu'ils renferment. Il est à regretter que votre Société ait perdu par la mort prématurée de M. Csoma de Cörös le moyen de donner à l'Europe accès à la littérature Tibétaine qu'il connaissait si bien ; mais vous avez autour de vous un si grand nombre d'hommes éclairés, qu'il ne vous sera pas difficile de combler cette lacune en portant la lumière sur d'autres points non moins intéressants. Votre Société est dans une admirable situation dont elle à déjà su profiter glorieusement pour elle et utilement pour la science, et dont elle profitera certainement encore.

Je ne veux pas terminer, Monsieur, sans vous remercier très vivement de l'envoi que vous avez bien voulu me faire d'un certain nombre de numéros de votre Journal ; ce présent extrêmement précieux pour moi m'a prouvé que votre Journal, se soutenait à la hauteur ou l'avait porté votre éminent prédécesseur J. Prinsep. C'est une chose capitale que ce Journal, et tous ceux qui en Europe le connaissent sont d'avis qu'il mérite que l'on fasse pour conserver son existence tous les sacrifices qui seront nécessaires.”

The following articles were presented to the Society by DR. HUTCHINSON, B. M. S. and were upon the table :—

1. A Tartar Bow, Arrows and Quiver.
2. A Tartar Cross Bow and Helmet.

* This valuable Paper was handed over for publication in the Journal.

3. A 3-barrelled Pistol.

4 A Hat, worn by Malay Fishermen in the Straits.

And through S. G. T. HEATLY, Esq., from W. MALING, Esq., Baugundee, the following :—

1. An Oil-Nut, known familiarly as the Nepaul walnut, the kernel strongly savouring of the walnut, and very oleaginous. These specimens were procured from the garden of Mr. MALING at Baugundee, where the tree flourishes luxuriantly. It was said to be originally brought there by Mr. BECHER, formerly Salt Agent, and to be a Nepaulese plant.

2. A kind of lac obtained from the Gaub, supposed to contain a red dye of value.

ZOOLOGY OF NIPAL.

A Portfolio of 31 Specimen Drawings, being a few of the illustrations of this proposed splendid publication, for particulars of which see advertisement, and specimen drawing, was exhibited, and excited the highest interest by the beauty of the drawings, and their remarkable fidelity.

Report of the Curator Museum Economic Geology for the month of February.

During the past month, we have received from Captain Goodwyn, Bengal Museum Economic Geology, Engineers a Model of a Terrace with a coating of half an inch of Asphaltum. The following letter accompanied it :—

No. 6504.

Mr. PIDDINGTON,

Curator to the Asiatic Museum.

SIR,—I am directed by the Military Board, to annex copy of a letter No. 943 of the 8th instant, from Captain Goodwyn, and also to enclose a note from that officer of the same date.

2nd. The specimen of the native Asphaltum Rock mentioned in the note, accompanies this communication.

3rd. You will observe, that Captain Goodwyn is desirous of receiving an acknowledgment from you of the receipt of the specimens herewith forwarded.

I have the honor to be, Sir,

Your obedient Servant,

H. DEBUDE,

Secretary, Military Board.

*Fort William, Military Board }
Office, 14th February, 1843. }*

No. 943.

To Major H. DEBUDE,

Secretary, Military Board.

SIR,—I have the honor to forward a section of prepared terrace with Concrete (which in this country can be well made with Jamma and Hydraulic Cement,) and half an inch of Asphaltic Mastic. The section shews the different strata, and I have sent it to the Military Board as a specimen of the solidity and toughness of the material after remelting, for the purpose of being floated on to a terrace.

2nd. I have communicated with Capt. Tremembere on the subject of the probability of discovering, in the Tenasserim provinces, a Geological bitu-

minous formation, from which something valuable might be obtained, and I at the same time sent him specimens of the raw material; but am sorry to learn from him in reply, that there is not any formation approaching that to which the mineral belongs.

I am now about to direct my enquiries in Arracan, as Petroleum wells and Naptha springs occur on the Irawaddy, and thence extend to the Arracan district.

I have, &c.

(Signed)

H. GOODWYN,

Executive Engineer, 1st Division.

Barrackpore, 8th February, 1843.

(True Copy,)

H. DEBUDE,

Secretary, Military Board.

MY DEAR DEBUDE,—I have already deposited in the Economic Geologic Museum, a specimen of the native Asphaltum Rock, so if the Board after examination of the accompanying are not desirous of keeping it in the Office, pray send it to Mr. Piddington with this note, that he may understand it is to be placed in juxta-position with the rock I gave him before.

I send also a specimen of the Mineral Tar, an exudation from the crevices of the rock, which will complete the whole history, as the powder of the rock mixed with the Tar forms the Mastic which is on the prepared section of flooring in the box.

If it goes to the Museum, I shall be glad of a line from Piddington.

Your's truly,

H. GOODWYN.

In a private reply to Captain Goodwyn, the proximity of the Petroleum wells of Cheduba, as detailed in Captain Halstead's report, was pointed out to him, and the probability, that if the Asphaltum itself was not found there, the residue of the Petroleum might furnish a mineral Pitch, which mixed with lime would make a good Asphaltum. Experiments will be made on this highly interesting subject.

From — DUNCAN, Esq., we have received a highly curious contribution of a piece of the Porcelain Tower of Nankin.

Captain NEWBOLD has sent us, at my request, a specimen of the best Cotton Soil from Kurnool. He is good enough to promise us a complete series of soils from that quarter, which will be a great addition to our Museum, The following are extracts from his letter:—

Camp Pialcoorty, Kurnool, February 13, 1843.

MY DEAR SIR,—I have this day forwarded by banghy, a specimen of our first class cotton soil in Kurnool. Let me know whether it is enough, and whether I shall send specimens of the *various sorts* of cotton soil for the Society.

I have not yet been able to visit the first class Tobacco field yet, and I would rather defer sending specimens until personal examination of the field, lest any error should occur. The cotton soil now sent is from a field in the vicinity of which my tents are pitched.

I shall be very glad if you will favour me with an analysis at your early convenience.

A specimen of some of the cotton soil of the Ceded Districts, which I sent to the Royal Society is in the hands of Mr. Solly, who has promised

an analysis, I believe, to one of the Societies at home ; but it had not been published at the time of my hurried departure from England. Professor Royle placed it in Mr. Solly's hands.

I was very much struck with the resemblance which the Regur soil that covers the *plateaux* of the Deccan bears to specimens of the "*Chorai Zem*," which Mr. Murchison brought with him from Russia, and which covers the Steppes of that country in a precisely similar manner.

The similarity also struck Mr. Lonsdale, the late talented Secretary of the Geological Society, who was also present at the Meeting when Mr. Murchison read his paper on the Geology of Russia in the last year.

Believe me,

Your's very truly,

T. J. NEWBOLD.

We have here to announce the recovery of the Catalogue of Captain Pemberton's Bootan specimens, which it will be recollected from my reports, had been sent to us by General McLeod, but without any Catalogue ; this I have at length succeeded by his assistance in tracing out. The following is an extract from his private letter :—

Mineralogy and
Geology.

Pemberton's Bootan specimens, which it will be recollected from my reports, had been sent to us by

General McLeod, but without any Catalogue ; this I have at length succeeded by his assistance in tracing out. The following is an extract from his

private letter :—

" London, 5, Manchester Square, Christmas Day, 1842.

MY DEAR PIDDINGTON,—I had the pleasure of writing to you on the 30th ultimo, and then promised that I should write again, after Mrs. Pemberton and I should have an opportunity of looking into poor Pemberton's Journals, and I am happy to say, that we then discovered what we hope may prove useful in enabling you to carry out your views, regarding the collection I sent you, although the information appears rather meagre.

" As Mrs. Pemberton was so much better acquainted with his hand-writing than I am, she undertook to copy out all that we could discover on the subject, and when we were doubtful of the words, from our ignorance of Geology, she has underlined them ; but she believes she made out almost all correctly. At all events, I have no doubt you will be able to clear up what may have appeared doubtful to us. We could discover nothing further than No. 138, nor could we find any Geological notes separate from this list. Enclosed you have Mrs. Pemberton's copy of the list, and it will afford us much pleasure to hear that it proves in any degree useful."

We have thus restored this very valuable collection to our Museum, and I have the pleasure to add, that we have also a complete set of duplicates of it, which will be packed for dispatch to the Honorable the Court of Directors.

In the course of my correspondence on the subject of Storms, during the past month I received from Mr. Howe, Marine Assistant to the Commissioner at Akyab, the following curious account of an eruption of one of their little volcanoes :—

Khyouck Phyoo, Feb. 7, 1843.

“We, however, had last night a most magnificent volcanic eruption. The mountain, which is of moderate height, and shaped somewhat like a pyramid, is about 3 or 4 miles from the station which was rendered as light as noon-day, though midnight at the time. The eruption commenced at about 11 P. M., unaccompanied by any rumbling, but throwing up masses and particles of lava to an immense height, and presenting a most magnificent spectacle, visible all round the country. The weather had been for some evenings previous, close and threatening, though the glass kept up, varying from $30^{\circ} 12'$ to $29^{\circ} 98'$ for the last 5 or 6 days.

“The fire gradually went out, and all was still again by about half an hour after midnight.

“This eruption takes place, from what I hear, generally once in two years, sometimes annually.”

We give with the present number, a specimen plate of the Chirú of Thibet, reduced from a folio-sized drawing, to accompany the Advertisement of the Illustrations of the Zoology of Nepal, to be published by Mr. Howard of London, which will be found at the end of the number; and it is but justice to the extraordinary native talent which has been thus developed amongst the Nipalese, by the means and patronage which have been so liberally afforded to them, by our talented associate to say, that judging from a port folio of the drawings lately exhibited at the Society's Meetings, nothing can surpass the truth and beauty of these Illustrations, which in the hands of Mr. Howard give every promise of being in the very highest degree worthy of the patronage of the Indian and European public.



Pantholops nob Pan. Hodgsoni. Abel Chiru of Tibet

JOURNAL
OF THE
ASIATIC SOCIETY.

*Memoir on Indian Earthquakes. By Lieut. R. BAIRD SMITH,
Bengal Engineers.*

Among the various Committees established by the British Association for the investigation of subjects of general scientific interest, one has been appointed to register Earthquake shocks in Great Britain, and its labours have already been made public in several Reports to the parent body. From the discussions consequent on the presentation of these Reports, it appears, that in the opinion of well qualified judges, results of but little comparative importance can be anticipated from observation made in localities, where the disturbing forces act with such feeble intensity as in those brought under the notice of the Committee, and it is therefore considered desirable, that similar observations should be made abroad, in tracts of country where greater energy characterises the disturbing powers, and where the effects of these are exhibited on a larger and more important scale. Several such tracts are to be found in India, and a few of the most remarkable convulsions experienced throughout them, are already familiar to scientific men. But no systematic effort has yet been made to record and analyse the various phenomena of Indian Earthquakes, and the narratives of these are scattered throughout the pages of various works, without connection and without method. To collect from every available source, all

the information connected with Earthquake shocks in India and its frontier countries, both in regard to those that have already occurred, and those that in future may occur, is the principal object proposed in this investigation. In regard to the historical portion of the subject, I cannot but feel conscious of its imperfections, since accounts of Indian Earthquakes are in general so meagre in important details, and must always be sought for under so many different sources, that to make the enquiry perfect, would require an amount of leisure and literary resources that very few, if indeed any, in this country, can command. In tracing the history of our Earthquakes, I have, however, done all I could with the materials at my disposal, and perhaps I may yet be able to complete what I now feel to be so imperfect.

More sanguine hopes of interesting results may, however, I think, be entertained in regard to Earthquakes that may be experienced after this time, since a general interest has been awakened in the subject, and the attention of many intelligent and well qualified observers attracted to it. Observations will moreover in future be centralised, and the unsatisfactory labour of gleaning information from many detached sources will be saved. Earthquakes are almost invariably observed when the feelings are excited, and emotions adverse to a calm, deliberate judgment on accompanying phenomena have sway. The greater the scale on which the disturbing forces are exhibited, the more intense will such feelings and emotions usually be, and in those very cases where minute and careful observations would be of the greatest value, observers are generally in a state the most unfavourable for making them. The sensible and permanent effects of Earthquake shocks are frequently detailed with painful minuteness, but those more temporary and evanescent, but at the same time, more immediately connected with the causes to which such convulsions are due, are allowed to pass by unobserved. The tendency to exaggerations induced by this state of mind requires constant allowances to be made for the statements of observers, and we shall be able to estimate the amount of this allowance, only after the phenomena of Earthquakes have been brought to the test of actual measurement by the use of appropriate recording instruments. Such instruments have been brought into use by the Committee of the British Association, but they are yet far from being perfect; and before their full utility can be felt, their sensibility must be increas-

ed considerably beyond the point to which it has yet been carried. This will no doubt ere long be accomplished, and the details of the phenomena of Earthquake shocks be removed from the ill-defined province of feeling, and brought under that of measured space and number.

The chief obstacle to the introduction of such recording instruments as are alluded to above, throughout the Earthquake tracts of India, will probably be found in the incessant fluctuations of society, and the consequent impossibility of obtaining consecutive series of observations. In reflecting on this point, it has appeared to me, that the most permanent local establishments in the country are the mission stations, and that if Missionaries residing in favourable localities, could be induced to receive and record observations with our instruments, they would confer a boon upon science at a very trifling sacrifice of time or labour in the cause. Earthquakes usually occur at distant intervals, and the observations required upon them, are neither complicated nor laborious. I would therefore hope to obtain in course of time the co-operation of those members of favourably situated mission establishments, who may not be unwilling to devote a limited portion of their time and talents to the elucidation of what is certainly one of the most interesting chapters of the physical history of India. Meanwhile, however, until arrangements can be matured for supplying instruments to those willing to receive them, I trust I shall continue to receive the interesting communications of those observers who have so zealously assisted me during the past year, and for whose aid I feel most grateful. Their individual labour will come more appropriately under notice in another page; but I am desirous of expressing to one and all, my acknowledgment of their valuable assistance, since to it must be traced all the interest that this investigation may possess.

To the gentlemen connected with the public press of India, especially to Messrs. Stocqueler and Place, Editors respectively of the *Calcutta Englishman* and *Delhi Gazette*, I am indebted for essential aid, and I trust I may continue to receive from them such notices of Earthquake shocks, as from time to time, may be made public in their papers.

My information relative to Earthquakes in the presidencies of Madras and Bombay is, I regret to say, extremely limited. In both there

are tracts occasionally subject to such shocks, and I would solicit the co-operation of observers under whose notice they may come.*

This Memoir will be divided into the four following parts :—

I. Register of Indian Earthquakes for the year 1842.

II. Historical Summary of Indian Earthquakes, with some remarks on the general distribution of subterranean disturbing forces throughout India and its frontier countries.

III. Analysis of the phenomena of Indian Earthquakes, as exhibited in the two preceding parts.

IV. Remarks on the points to be observed during Earthquake shocks, and on the means of making the requisite observations.

Part. I.—Register of Indian Earthquakes, during the year 1842.

1. JELLALABAD EARTHQUAKE OF THE 19TH FEBRUARY, 1842.

My attention was first prominently attracted to the subject of Earthquakes in India, by the occurrence of that of the 19th of February last. A few brief and imperfect notes founded upon the details I was able to collect, were published in the Journal of the Asiatic Society and my object then was, more to direct attention to the subject of Earthquakes in general, than to furnish rigidly accurate conclusions on this case in particular. Such conclusions were indeed incompatible with the nature of the information furnished me, and I have subsequently ascertained, that many corrections of these are requisite. Yet the notes have fully answered their design, and have led to my procuring much information, which, had they not been published even with all their imperfections, would certainly have been lost to science. From the date of the Earthquake my register was commenced, and it is my intention to continue it regularly, publishing it at yearly intervals. I have some recollection of two Earthquakes having been experienced in Delhi during the month of January 1842, but unfortunately I did not record them at the time, my register not being then commenced, and I have been unable since to verify this im-

* All communications on the subject of Earthquakes in India may be addressed to the author at Seharunpore, North-western Provinces, Bengal, or if preferred, to the Secretary to the Asiatic Society, Calcutta, or to any of the public papers.

pression. The Jellalabad Earthquake therefore comes first in order, in the year 1842.

In tracing the progress of this Earthquake, I purpose commencing at its most westerly limit, and following it to the Eastward. According to this plan, the first place where its effects are to be noticed is *Cabool*, (lat. 34° 30' 30" ; long. 69° 7' E.) The intelligence from Cabool is, however, extremely limited, being confined to the following short extract from a narrative of the events of the captivity at that city, by Dr. Berwick and his party of sick and wounded, left behind, when the British force attempted to retreat to Jellalabad.

“ On the 19th of February,” it is remarked, “ they were visited by a most awful Earthquake. It continued for some minutes, and rocked the fort in a frightful manner. All the men able to move rushed out into the open air, every moment expecting the walls to fall in and bury them ; but God was good, and after three minutes’ duration, each shock succeeding the other in rapid succession, it ceased. The walls were dreadfully shaken, especially the side wall of the European ward, which came down a few days afterwards.” From the effect of the shock, as detailed in this extract, it may safely be inferred, that Cabool did not form its extreme westerly limit, but we have no authentic intelligence of its progress beyond that place, and its would therefore be vain to speculate upon the point.

Proceeding Eastward over a tract of country more rugged and inhospitable than can well be conceived, and descending from a height of about 7,000 to a little more than 2,000 above the level of the sea, we enter the valley of Jellalabad, where the devastating effects of the Earthquake were exhibited on a larger scale than at any other place. The whole line of the Cabool river from Cabool to Jellalabad, experienced, however, the effects of the shock, and many of the forts of the chiefs were laid in ruins, or seriously injured. Among others, that of Budiabad, in which the English prisoners were then confined was, I am informed, much shaken, although not destroyed.

The valley of Jellalabad is thus briefly described by Lieut. Wood of the Indian Navy :—“ A ridge of hills called Deh Koh, or the black mountain, rises about Jugdulluck and running East by North till it meets the Cabool river, bounds the plain of Jellalabad on the North ; to the South it has the high hill of Nungnihar ; East it has the hills of Alee

Baghan and desert of Buttee Kote; while its Western limit is marked by ridges, which here project into the valley of the Soorkh Rood. The length of the Jellalabad plain is 25 miles, and its width does not exceed four miles."

The town of Jellalabad (lat. $34^{\circ} 25'$; long. $70^{\circ} 30'*$) was garrisoned at the period of the Earthquake by General Sir Robert Sale's Brigade, and hence our information as to the effects of the shock is in considerable detail. The following extract from the *Englishman*, gives the most graphic account of the Earthquake I have yet seen.

Extract from a letter published in the Calcutta Englishman of the 16th May 1842, dated Jellalabad, 28th April, 1842.

"On the 19th February, we had one of the most awful Earthquakes I have ever experienced; it occurred at mid-day, being very stormy at the time, with clouds of dust floating through the atmosphere. The shock lasted about a minute and a half, and commenced with a sound like the rolling of a heavy waggon over a wooden bridge—the earth swung to and fro like the rocking of a cradle; not a man could keep his legs; every one fell prostrate, and a sensation of sickness and giddiness affected all. Bastions and houses came tumbling down with a dreadful crash, and we verily believed we were about to be swallowed up in some yawning chasm. The earth did open in several places, and water appeared on the surface of the ground. The river was thrown into the most violent commotion, and the water dashed over its bank with frightful violence. I was standing on a bastion at the time, it split in two places and crumbled down; I was precipitated to some distance, where I lay stunned and stupified with horror. No one could utter a word, and every face was blanched with terror and apprehension; here was death in a new form, for which we were totally unprepared. Providentially for us, not a man of our party was killed; many were injured by the falling of the houses, but none dangerously: a few of the inhabitants of the town were killed, where the fall of the high houses choked up the street, and left no room for escape; but on the whole the accidents were few, compared to the nature and extent of the mischief. From this period until the

* The positions of places in Afghanistan, are taken from Walker's New Map.

middle of March, we had frequent slight shocks, sometimes so many as six or seven during the twenty-four hours. Our fortifications were seriously damaged by this awful visitation, and we fully expected the enemy would have made a rush upon us, for there were gaps enough, but every precaution was taken to repel them. They hovered about us, however, like birds of prey, trying to ascertain the extent of our damage; whether they learnt it or not I cannot say, but seemingly they thought it better to let us alone. We fell to work again with renewed energy, and in a short time repaired much of the injury the works had sustained, labouring night and day without intermission, until we were once more able to set the enemy at defiance."

The appearance of water at the Earth's surface through fissures made by Earthquake shocks having been connected with theoretical considerations on the causes of the events,* I felt desirous of verifying the statement made in the above extract, that this phenomena was observed at Jellalabad, and I therefore wrote to my friend Major Broadfoot, C. B., requesting him to give me any information on the point he might possess. In reply, under date Jellalabad, 13th July 1842, he thus writes: "You ask where the water came from that issued from the cracks in the earth. I saw no water issue from the cracks which opened where I was, nor signs of any in others, and I saw more of the effects and sooner than perhaps any one else; nor do I remember hearing of water issuing from the earth at the time. Still it *may* have happened." And the nature of Major Broadfoot's duties gave him the best possible opportunities of observation, it is probable that had water actually been ejected from the earth, the circumstance would not have escaped his notice, and the statement that it did do so, must be considered as very doubtful.

A few further particulars of the Earthquake at Jellalabad are given in the following extract from Sir Robert Sale's official dispatch, dated Jellalabad, 16th April 1842: "But it pleased Providence, on the 19th of February, to remove in an instant this ground of confidence (alluding to the defensive works executed by Major Broadfoot for the protection of the city.) A tremendous Earthquake shook down all our parapets built

* On Hydrostatic Pressure as a cause of Earthquakes, by the Rev. John Toplis, B. D. Jameson's Journal, No. 59, p. 84.

up with so much labour, injured several of our bastions, demolished a third of the town, made a considerable breach in the rampart of a curtain in the Peshawur face, and reduced the Cabool gate to a shapeless mass of ruins. It savours of romance, but it is a sober fact, that the city was thrown into alarm, within the space of little more than one month by the repetition of full one hundred shocks of this terrific phenomenon of nature."

The Jellalabad Earthquake is here considered solely in its relations to science; but it may be permitted me to turn for a moment from the cold record of physical phenomena, and to express the admiration all must feel at the noble conduct of that gallant band, whose moral courage rose superior to the depressing influence of such a series of convulsions at such a crisis, and whose physical exertions so rapidly obliterated their devastating effects, that their wondering foes could attribute the result only to some supernatural agency, to some English witchcraft.

The superior intensity of the Earthquake in the immediate vicinity of Jellalabad, and the incessant state of "*tremblement*" into which the earth there was thrown for so long a period after the great shock, appear to me to render it almost certain, that the focus of disturbing force was situated in that valley, and that the undulations generated were propagated East and West from some point in it as a centre. Most of the shocks subsequent to the great one of the 19th February were local, and a very few only were felt at Peshawur to the Eastward, and none in so far as I know to the Westward. The disturbing force to which the series was due, must therefore have been confined in its action to the valley of Jellalabad, and the effects would indicate, that its focus was at no very great depth beneath the surface of the earth, and that farther, a large amount of its power was expended on the 19th, since the other shocks were feeble in comparison with the one experienced on that day.

From the best information I can procure, the time at which the Earthquake was felt at Jellalabad was 11h. 40m. A. M. All the times subsequently stated, will be reduced to Jellalabad time, so as to shew correctly the progress of the shock. This correction was neglected in my notes formerly published, in consequence of the very great discre-

pancies among the periods stated by different observers, and the impossibility of their knowing which were correct. Information subsequently obtained, has, however, admitted of greater certainty as to time, and greater care is therefore requisite in combining the observations.

From Jellalabad, the shock affecting a portion of the Suffeid Koh range of mountains, with the numerous subordinate ranges that diverge from it, reached the town of Peshawur, (lat. $34^{\circ} 06'$; long. $71^{\circ} 42'$, E). From the circumstance of General Pollock's force having been encamped at Kawulsur, about eight miles from Peshawur, and the communication being uninterrupted, the details relative to the effects of the shock there, are fuller and more satisfactory than would otherwise have been the case.

The following extracts from letters published in the *Delhi Gazette*, give the most complete accounts of the effects of the Earthquake I have been able to find:—

Extract from a letter, dated Kawulsur, 20th February, 1842.

“Yesterday a fearful Earthquake visited this part of the world. The shock which came on———,* was long continued, and men, horses, tents, even the ground under us, and the hills in the distance, appeared to be moving. It was an awful visitation, and made every heart quake. In the direction of Peshawur, (eight miles distant,) clouds of dust appeared, which proved to have been caused by the falling of very many houses and buildings. A salute was fired from the battery at Jumrood, for the purpose of announcing the safety of Rajah Pertaub Sing, son of Maharajah Shere Sing, who is now at Peshawur, and of whom it is said he narrowly escaped death: the building in which he had been sitting came down almost immediately after he quitted it. The natives say a tenth of the city is down, and a number of the inhabitants killed.”

Extract from a letter, dated Kawulsur, 19th February, 1843.

“It is now about 12 o'clock mid-day, and we have just experienced a most awful Earthquake in Camp. The natives say that nothing so severe of the kind has been experienced in India for the last fifty

* The time stated being erroneous, is omitted. The times generally are still by no means so satisfactory as is desirable.

years. The earth literally trembled like an aspen leaf, and rocked to and fro as an infant's cradle, or like a ship at sea. Many of the camels that were carrying the baggage of the troops to Col. Wild's camp were thrown down, and so great was the shock, which lasted fully five minutes, that I was obliged to support myself by holding on to the camp furniture, and many of the officers fancied themselves suddenly taken ill. I expected every moment to have seen the earth open and swallow us up, and it is only by God's great and merciful providence that we have escaped through such an awful convulsion of nature.

“Every one complains of nausea. We have just been observing immense volumes of dust, that completely darken the atmosphere in the direction of the old ricketty town of Peshawur, which is supposed to be nearly levelled with the ground, as the houses are but weakly built, being merely propped up by the beams of wood which may be observed placed in different spots under large walls and corners of the houses, and are even dangerous to passers-by at all times. I doubt not but to-morrow's dawn will bring us dreadful intelligence, and produce a fearful account of lives lost.—*20th February.* Reports say, that only from 40 to 50 persons at Peshawur were crushed and killed among ruins of the falling houses. General Avitabili's large dwelling house, which had recently been built, and was being finished, fell in, but luckily did no injury to any one in the house.”

The period of the shock at Peshawur was 11h. 41m. 12s. Jellalabad time, the observed time at the former place being 11h. 46m. and the difference of longitude 4m. 48s.*

The course of the Earthquake hitherto has been through a tract of country rugged and mountainous in the extreme. The geology of the district extending from Cabool to Peshawur has never been satisfactorily described, and very little, I might indeed say nothing, whatever is yet known about it. Dr. Lord gives the following general remarks on the great features of the country, and some of the points alluded to by him, as indicating severe disruptive action, are interesting in con-

* Captain Lawrence, late Political Agent at Peshawur, assures me, he feels quite certain as to the period of the Earthquake at that place; he having been led to watch the time narrowly, in consequence of a meeting between General Pollock and Rajah Pertaub Sing being to take place at noon exactly, arrangements for which were in progress under his superintendence.

nection with the frequent occurrence of Earthquake shocks throughout the tract. The facts embodied in Dr. Lord's remarks, must be separated from the theoretical views with which they are associated, the latter being open to serious objections; but as there is reason to believe they are now under discussion by a very competent authority, it is unnecessary to allude farther to them here.

“A parallel of latitude,” Dr. Lord remarks, “drawn through Kalabágh and west of the Indus would present a remarkable difference in the course of the mountain chains as observed to its north and south sides. In the latter direction, the Soliman and Kala ranges, the one of which may be looked upon as a continuation of the other, generally preserve an almost perfect parallelism with the course of the Indus; while on the other side every range, and they are numerous from the Himalaya and Hindu Kosh to the Salt range inclusive, are at right angles with the direction of the stream. In other words, the general line of the former is North and South, of the latter East and West. It is of the latter, and the country they include, that I would more particularly speak at present.

“In addition to the general course of the chains thus laid down, there is another fact, subordinate, yet of no less importance towards determining the physical formation of this part of the country. When the two mountain ranges have for some time preserved their parallel East and West course, the Northern is observed to deflect, or send off a branch towards the South, while a corresponding deflection or ramification of the Southern chain comes to meet it, and the plain which otherwise would have been one continued expanse from East to West, is thus cut into a number of valleys, the longitudinal axis of which, however, is still in general to be found in the same direction. If we conceive these valleys to be few, spacious, and well marked towards the North and South, while in the central or Cabul region they become small, numerous and crowded, so as to resemble a tangled maze or net-work, we shall have a just general conception of the tract of country west of the Indus, which may be familiarly described as lying between Cabul and Kalabágh.

“Unquestionable geological facts, such as the structure of igneous rocks poured out under strong pressure, the presence of fossil shells

&c. lead me to the belief that several, if not all of these valleys, were at some former time the receptacles of a series of inland lakes, and the natures of the shells found (principally planorbes and paludinæ) seem to indicate that the waters of these lakes had been fresh. In this manner three grand sheets of water, separated by the mountain deflections before alluded to, would appear to have occupied the entire country from Kabul to the Indus, and their basins may now be distinguished as the plains which afford sites to the three cities of Kabul, Jellalabad, and Peshawur.

“ The draining of these basins is tranquilly carried on by the Kabul river, which runs along the northern edge of each, conveying their united waters to the Indus: but in former times when more energetic means were necessary, the mountain barriers burst, and the shattered fragments and rolled blocks that now strew the Kyber Pass, bear testimony to its once having afforded exit to a mighty rush of waters, while the Gidur-Gulla (or Jackall’s neck,) a long defile east of the plains of Peshawur, clearly points out the further course of the torrent towards the bed of the Indus, whence its passage to the ocean was easy and natural.”

The questions in pure geology involved in these remarks I do not concern myself with, but I have quoted them to shew, that indications of powerful disruptive forces prevail throughout the whole of the course of the Earthquake of the 19th February hitherto described, and this point is all that circumstances admit of being established. Of the nature of the rocks composing the mountain masses between Cabool and Jellalabad, I have seen no account. Major Broadfoot states, that the rocks in the immediate vicinity of Jellalabad are gniess, and Sir A. Burnes mentions, that mica slate and granite are also found there. Relative to the rocks in the Kyber Pass, my friend Lieut. Goodwyn of Engineers, writes thus: “ The Kyber rocks are of flinty slate, varying in all degrees of hardness from flint to slate. Sometimes the rock is nearly one solid mass, the strata are so slightly defined, and they cannot be separated with a crow-bar—at other places, a blow of a pickaxe is sufficient to shiver it into fifty little cubes of slate; a considerable quantity of earth lying between the strata, which falls down in dust. Sir Alexander Burnes says, “ The formation is a flinty slate overlying conglomerate, but

I have also frequently found the conglomerate overlying the slate, and they are frequently united in the same rock. The conglomerate is very hard, and we could not progress more than four inches an hour, with two-inch jumpers, in boring holes for blasting. The stones seem cemented with a sort of iron cement."

After leaving Peshawur, the shock traversing the alluvial plains of the Punjaub reached Ferozepore, (lat. $30^{\circ} 56' 50''$; long. $74^{\circ} 35'$), where its force was still felt to be severe, though no longer destructive. No accounts have been made public of the effects of the shock at any place intermediate between Peshawur and Ferozepore. The latter place was reached at 11h. 48m. 40s. A. M. Jellalabad time.

The city of Delhi, (lat. $28^{\circ} 40'$; long. $77^{\circ} 16'$), is the next place from which we have authentic intelligence of the effects of the Earthquake. The intensity of the shock was, however, very much diminished here, and beyond the motion of the ground no other effects are alluded to. The period of the Earthquake at Delhi, as stated in my notes formerly published, I find to be erroneous, and the proper time from the best information I have been able to procure, is 11h. 53m. 56s. A. M. Jellalabad time. Relative to the nature of the shock at Delhi, Mr. Sub-Conductor Bingham of the Sappers and Miners thus writes: "The total duration of the shock, which appeared to me to consist of several distinct undulations of the earth, but without perceptible intervals between them, could not have been less than five or six minutes. But of this I cannot speak definitely, as I had no reference to a time-piece during the shock."

About twenty miles to the South-west of the city of Delhi, at a village called Sonub, is situated a hot spring, of which the following description is given anonymously in the second volume of the *Gleanings in Science*, p. 34:—

"At Sonub near Delhi, there is a hot spring (sulphureous) which attracts from the surrounding country myriads of people for the purpose of bathing; the bath is constantly filled with as many people as it can hold, (except perhaps for a few hours during the night,) in the day time by men, and the night time by women; most of the inhabitants of the town itself are in the habit of bathing in it daily, and it is perhaps to this habit, that they are indebted for the cadaverous and

unhealthy appearance so common among them. The temperature of the spring in January last, (1829,) was 103° ; but it varies, for in July, 1826, I observed it as high as 110° . The flow of water also varies considerably."

Dr. Malcomson of Bombay, having made enquiries of Dr. Falconer, late Superintendent of the Botanic Garden, Seharanpore, as to whether this spring was affected by the Earthquake of the 19th February, the latter referred the question to me, and I availed myself of the assistance of my intelligent and indefatigable correspondent, Mr. Bingham, in instituting enquiries on the spot. Mr. Bingham applied first to the Deputy Collector of the district of Goorgaon, in which district the spring is situated, but so little interest was taken by him in the matter, that he did not even reply to Mr. Bingham's letter. This indifference, on the part of the Deputy Collector, was, however, compensated for by the interest and activity, shewn by Mr. H. Martin, the Superintendent of Roads in the same district, who so soon as applied to by Mr. Bingham, visited the spring, and addressed the following interesting letter to me, giving the results of his enquiries:—

Letter from Mr. H. Martin to my address, dated 15th October, 1842.

SIR,—Having been requested by Mr. Bingham, to obtain for you what information I could on the subject of the alterations which took place in the hot wells of Sonub. I yesterday visited them, and have much pleasure in transmitting to you the results of my enquiries, which I trust will prove of utility to the object you have in view.

"On the 19th February last, (the day of the Earthquake,) the water in the wells became as cold as that of the ordinary wells of this country—the issue of the spring was observed to flow much slower, and in less quantities than formerly, and at times the spring would be completely dry. No disturbance of any kind was visible, nor any other change than what I have noticed. The above appearances continued for twenty-five days, when the wells resumed their former state.

"I would remark, that this statement may be credited, as all to whom I applied answered with readiness, and from the length of time which the appearances lasted, there could hardly be a mistake.

"Should you wish for any more detailed particulars, or if I could be of any assistance to you in any way on any other subject that may

relate to this district, I shall be most happy in furnishing you with all the information I can procure." I am, &c. &c.

H. MARTIN.

In continuation on the same subject, Mr. Bingham writes under date 1st Nov. 1842 :—

" I wrote some time ago to Mr. Martin, for information regarding the locality of the springs, and it appears from his reply, that they are situated within 200 yards, (but he does not state whether on the East or West side,) of a range of low hills, which I have myself formerly traced from where they cross the Jumna, about two miles to the north of Delhi, running in a southerly direction beyond Muttra.* There are no rocks in the immediate neighbourhood of the hot springs, but the hills are principally composed of a very hard stratified quartz stone, the strata dipping at an angle of 70° or 75°, with numerous vertical cracks and fissures through them, as if they had been suddenly and violently heaved up.

" There is also here and there a stone of different formation found lying upon the quartz; in some places, it is merely 'bujree' (red sand,) in others a soft red sandstone. The city of Delhi is mostly built upon these rocks, and some years ago when employed in blasting to form a ditch for one of the bastions on the south side of the city, I had often occasion to remark the impressions of the roots and fibres of vegetable† in the same stone; but in the quartz rock, I never met with any foreign substances, except some slight traces of a metallic nature, which appeared to me to be zinc or copper."

As the Sonub hot spring in all probability rises through one of those fissures so common in the vicinity, the effect of the earthquake seems to have been to close this exit of the waters temporarily, as the supply diminished so much immediately afterwards. And the diminution of the supply would lead to the water becoming colder in consequence of its exposing a lesser bulk to the cooling influences of the strata

* These are the Aravulli range of hills, which abutting on the Western termination of the Vindyas, run up through Rajpootana, and are lost at some little distance to the Northward of Delhi.

† The nature and relations of this sandstone render it probable, that these vegetable forms were not the remains of actual vegetables, but were those dendritic forms of doubtful origin so common in similar circumstances.

through which it passed. The obstacle in the path of the waters, whatever its nature may have been, appears to have been wholly removed at the end of twenty-five days, as then the temperature and quantity of the water returned to its usual standard.

Continuing to the Eastward of Delhi, the next place from which intelligence was received relative to the effects of the shock, was Poojnah, a station on the Doab Canal, (lat. 29° 32', long. 77° 27'?) where Sergeant and Assistant Overseer Renny observed and communicated to me the following detail:—

Extract of a letter from Sergt. Renny, dated Poojnah, 19th Feb. 1842.

“I also beg leave to inform you, that we felt a very severe shock of an Earthquake here at — *. It lasted about three minutes with intervals. My whole family felt it as well as the people about my place, who came running to me much alarmed. It was first noticed I believe by myself, as I was then sitting writing, and found a heavy table on which my desk was laid, much agitated, which I thought was caused by some one moving; but I soon found my chair in motion also, and on looking about, I perceived every thing moveable in the room in a state of agitation. A few hours before this, I observed the water in the canal was unusually muddy, and after the shock was over, I went to look and found it much disturbed by a high swell, whether occasioned by the shock or not, I cannot say.”

Sergt. Renny is entitled to my best thanks for these interesting details. The unusual muddiness of the canal could not possibly have been due to the influence of the Earthquake, since the direction in which the shock travelled was against, not coincident with that of the current in the canal, hence the disturbance of the silt in the bed of the canal could not *precede* the shock; but it is quite possible, that the high swell observed *after the shock had passed*, may have been occasioned by it. The time of the shock at Poojnah was, as nearly as I can estimate it, 0h. 00m. 12s. P. M. Jellalabad time.

From Poojnah, the shock travelled to Saharanpore, where it was just felt, but attracted no particular attention. It was next experienced at Kulsea, another station on the Doab Canal, about twelve or fourteen miles to the Northward of Saharanpore, where its effects

* The time stated being erroneous, is omitted.

were very perceptible. The motion here, as described to me by Mr. Sub-Conductor Pigott, was of the same undulating character as observed throughout, but its duration was certainly not greater than one minute. Immediately on perceiving the shock, Mr. Pigott examined the sun-dial, and making a slight allowance for the error of the dial, and that for the longitude of the spot which has not been determined, the true period appears to have been very nearly 0h. 03m. 44s. P. M. Jellalabad time.

My camp was pitched about two miles North-west of Kulsea on the South bank of the Nowgong Row, (or stream,) but so feeble was the intensity of the shock, that although I was conscious of some peculiar motion at the time, it never occurred to me that it arose from an Earthquake, and it had passed from my mind till recalled by Mr. Pigott's account of what had been felt at the same time at Kulsea.

Mussoorie, in lat. $30^{\circ} 30'$, long. $78^{\circ} 10'$ *, forms the most easterly limit of the Earthquake of the 19th February, in so far as my information extends. A merely incidental notice, in a Meteorological Register kept by Major Aitchison at Mussoorie, informs me of its having been experienced there. The shock, however, appears to have traversed a large portion of the Himalayan chain, since I am informed by Capt. Hutton, that it was felt at Shalkur on the borders of little Thibet, by Lieut. D. Cunningham of Engineers.

It therefore appears from the preceding details, that the tract affected by this Earthquake is, so far as determined by authentic intelligence, extended from the 69th to a little beyond the 78th meridian of East longitude, and from between the 34th and 35th to between the 28th and 29th parallels of North latitude. The superficial area thus affected, amounts to nearly 216,000 square miles, and within it are included mountain masses of great extent, varying from 2 or 3,000 to 10 and 12,000 feet in height above the level of the sea.

The general course of the shock was from East to West, parallel with that of the range of the Himalayas. Its mode of propagation appears to have been analogous to that of the waves generated when a flexible piece of metal or other substance is seized at one extremity

* The geographical positions of places in India are taken from the table of latitudes and longitudes published in Rushton's Gazetteer. They are not always strictly correct.

and shaken violently. A succession of waves flow along the course of the disturbed body, following each other rapidly until the moving force is withdrawn, and thus it appears to have been with the Earthquake under review. A series of great waves were generated on the 19th, and propagated, with an undulatory motion to a great distance, and series of smaller ones continued for upwards of a month afterwards to be continually formed, but propagated only to a very limited extent, but all in the same direction with the first mentioned.

As some remarkable instances of disturbance of the magnetism of the earth are recorded to have occurred during Earthquake shocks, it struck me that similar phenomena might possibly have been observed on the present occasion at the Simla Magnetic Observatory, and I therefore wrote to Major Boileau of Engineers, the Superintendent, on the subject, and he was kind enough to reply as follows, under date 5th November, 1842:—

“The magnetometers have been watched with great care during (*i. e.* on and after) the occurrence of Earthquakes, and there never has been any disturbance in their mean readings, though the mechanical effect has been apparent by the vibrating motion communicated to the instruments. The delicacy of our magnetic instruments is such, that a movement equal to two seconds of arc would be detected immediately, and I hold the total absence of any such indications, as almost amounting to proof, that Earthquakes are not magnetic phenomena.”

If the observations at the Simla Observatory are to be held as decisive on the point, then certainly it is a just inference, that no connection exists between Earthquakes and disturbances of terrestrial magnetism; but as these observations may be opposed by numerous others indicating distinctly I think, such a connection, although the precise nature of it is yet mysterious, Major Boileau's inference must be looked upon as premature, and his observations prove, it appears to me, nothing more than, that at Simla, the Earthquakes have hitherto produced effects only mechanical, but it by no means thence follows, that Earthquakes generally are not in any respect magnetic phenomena. The question is still an obscure one, and the observations which have led to the impression that the causes of Earthquakes are connected with terrestrial magnetism have been made chiefly in districts where volcanic forces are in actual operation, and where the

causes of Earthquakes, whether of terrestrial or atmospheric origin, are in full activity, circumstances to which no analogy is presented at Simla, since I am not aware of there being in the vicinity of that place, one single proof of active volcanic agency. The question will doubtless be farther elucidated ere the labours of the various magnetic observatories are closed, but it is unnecessary to dwell longer upon it now, as it will again come under notice at a subsequent period.

The following table presents a general view of the course and phenomena of the Jellalabad Earthquake, and with it, the account of this remarkable event will be closed:—

TABLE.

Places affected.	Geographical Position.		Period of Shock.	Time from point of greatest force.	Approx. Distance in degrees of Long. from point of greatest force.	Remarks.
	Lat.	Long.				
Cabool, ..	34° 30' 30"	69° 7'	Not specified.	..	..	Shock very severe.
Jellalabad,	34 25	70 30	11h 40m 0 ^s	..	..	{ Point of greatest force.
Peshawur, ..	34 06	71 42	11 41 12	0 1 12	1 12	Shock, very severe.
Ferozepore,	30 56 50	74 35	11 48 40	0 8 40	4 05	Shock, smart.
Delhi,	28 40	77 16	11 53 56	0 13 56	6 46	Ditto do.
Poojnah, ..	29 32	77 27 ?	0 00 12	0 19 12	6 57	Ditto do.
Saharan- } pore, ... }	29 57	77 32	Not specified.	..	7 02	Shock, slight.
Kulsea,	30 08	77 34	0 3 44	0 23 44	7 04	Shock, very slight.
Mussoorie, .	30 30	78 10	Not specified.	..	7 40	Shock, smart.

2. EARTHQUAKE OF THE 5TH MARCH, 1842.

On the evening of the 5th March, 1842, a very severe shock of an Earthquake was experienced at several stations in the North Western Provinces, about 9 o'clock P. M. Judging from its effects, it appears to have emanated from the interior of the Himalaya, since the stations in and near the hills were much more seriously affected than those at a distance from them. Thus the effects of the Earthquake at Mussoorie, (lat. 30° 30', long. 78° 10'), about 7,200 feet above the level of the sea, were much more severe than at Saharanpore. In Major Aitchi-

son's Meteorological Journal, the following details of the shock are given :—

“5th March. Thermometer at sunrise 62°, wind East. Thermometer at sunset 58°, wind as in the morning, weather clear. At ten minutes past 9 P. M. a most violent shock of an Earthquake, which lasted about a minute Colonel Young's house at Deyrah was much injured, also Major Thompson's at Mussoorie, and Lord Henry Gordon's at Landour was rent from top to bottom,” venetian blinds also rattled strongly, lamp glasses were violently shaken, and the oscillations causing these effects appear to have come from North to South.

The motion of the Earth from all accounts appears to have been horizontal, and the nature of the shock was wholly distinct from that of the preceding Earthquake; all who experienced both assuring me, the difference was perceptible to them at once. The effect in the present instance, instead of being like the rounded swell of a fluid or viscid mass, was sharp and sudden, like the effect of a concussion than of an undulation, and seemed indeed to be a much magnified “jarr,” similar in kind to that experienced by the hand when a hammer held by it is struck on a hard unyielding body. One intelligent friend who was in his study when the shock occurred, described his sensations to be, as if he and his chair had received a sudden and severe blow from behind, and been both; impelled forward, and this appears to have been the characteristic of the shock.

The following interesting details of the Earthquake as experienced at Berkeri on the Doab Canal, were communicated to me by Sergt. and Overseer J. Petrie, to whom I feel much obliged for his trouble in preparing them :—

Letter from Sergt. J. Petrie to my address, dated 5th March, 1842.

SIR,—We had a very smart shock of an Earthquake here this evening at about 9 o'clock : so much so indeed, that every thing in this bungalow shook and rattled again. I had just laid down to rest with a book in my hand when it came on, and I started up and called out for assistance, thinking the house was coming down. Every one about the place felt it, and came running to me. I found the South door of the inner room, which I had bolted before I went to bed, had been forced open by the bolt falling down. Indeed every thing in the house

shook, and I was very much afraid of its falling, after having read the accounts from our Army near Peshawur. At that place a number of houses have been destroyed, and many lives lost from the last Earthquake.

“ Although this shock did not last so long as the one of the 19th of last month, in my opinion it was much more severe for the time.

I am, &c. &c.

J. PETRIE.”

The rate of propagation of this shock appears to have been very rapid, as no perceptible difference in its period of arrival was observed at any of the following stations; namely, Simla and Mussoorie in the Himalayas, Deyrah in the Deyrah Dhoon, Saharanpore and Berkeri. The nature of the shock would indicate that the seat of the disturbing force must have been within the rocky crust of the earth, or at a very small distance indeed beyond it, as such a supposition accounts best for the peculiar “jarring” sensation characteristic of the shock. All who experienced the Earthquakes of the 19th of February and 5th of March, concurred in opinion, that they came from opposite directions, and as the former was from West to East, the latter must have been, as before stated, from North to South, and this is in some measure confirmed by the fact stated in Sergt. Petrie’s letter, that the Southern door of the inner room of the Berkeri canal bungalow was driven open by the shock, as it would receive the first impulse.

3. EARTHQUAKE OF THE 21ST OF MAY, 1842.

The Earthquake of the 21st of May, experienced in the Lower Provinces, appears to have been only a slight shock, and its direction, in so far as this can be determined from the facts communicated, was from South-west to North-east. The most Westerly point from which I have received any intelligence of its effects is Juanpore, a station about forty miles to the North-west of Benares, the latter being in lat. $25^{\circ} 30' N.$, long. $83^{\circ} 1' E.$

The following letter from Vincent Tregear, Esq. furnishes an account of the shock as felt at Juanpore:—

Juanpore, 29th May, 1842.

“DEAR SIR,—I have to-day received the Journal of the Asiatic Society, No. 123; and as you invite communications regarding Earthquakes, I hasten to inform you, that a slight shock was felt here on the 21st inst. between the hours of 8 and 9 A. M. I did not, I regret to say, note the time, because I found that no one else in the house noticed the shock. In the evening I met Mr. Tulloh, who asked me if I had ‘felt the Earthquake?’ shewing that it was not mere imagination on my part. The motion seemed to be North and South. It was in reality nearly vice versâ,” but without reference to some standard indicator of direction, it is impossible from mere sensations to tell the direction of a shock correctly.

“The weather,” Mr. Tregear continues “here is exceedingly oppressive, and if such a state of the atmosphere can be considered as prophetic, I think we have more natural or unnatural convulsions at hand. It is more than possible that chemical or mechanical changes in the interior of the earth have great electrical influence on the surface; and these changes may be accompanied by perceptible vibrations.* * * * *

Faithfully yours,

VINCENT TREGEAR.”

I shall have occasion in another part of this memoir to allude to some interesting atmospherical phenomena which have been found to accompany Earthquake shocks, but as this Register is intended to be simply narrative, I do not at present make any comment on Mr. Tregear’s remarks.

The next place from which we have any record of this Earthquake having been felt is the city of Patna, in lat. 25° 37’ N. long. 85° 15’ E. Our information is limited to the following extract from the *Calcutta Englishman* of the 28th of May:—

“A letter from Patna,” the Editor states, “mentions that a smart shock of an Earthquake was felt there at 8h. 36m. A. M. on the 21st instant.”

The shock travelled next to Darjeeling, in lat. 27° 00’ N. and long. 88° 25’ E., and situated at a height of about 7,000 feet above the level of the sea. The following letter from Arch. Campbell, Esq. Superintendent of Darjeeling, gives details of the shock as experienced at that place:—

Darjeeling, June 4th, 1842.

MY DEAR SIR,—I have seen your account of the Earthquake of the 19th of February last in the last number of the Journal of the Asiatic Society, and in compliance with your desire therein expressed to be furnished with notices of Earthquake shocks occurring in all parts of India, I have to inform you, that a slight shock was experienced at this place on the morning of Saturday, the 21st of May last, at or nearly about 10 minutes past 9 o'clock A. M. I call the shock a slight one, because it was not sensible to every person at the station, and because there was no damage done to houses or other property. It was experienced by a person in my house, although I was not aware of its occurrence. I was engaged dressing at the time, and standing, while the other person was sitting in another room reading. The sensation is thus described: "I was seated on a chair opposite to the fire when I felt a hitching motion sideways. This was repeated two or three times, and was not accompanied by any noise." The chair was placed East and West, so that the course of the shock would appear to be North and South; but whether from the South to the North, or vice versâ, the person describing it cannot say. A gentleman at the Hotel, one mile North from my house, describes the shock as having been more severe. He was also dressing at the time, and staggered into his bearer's arms, after which he had a feeling of nausea which continued for some hours. At Mr. Maddock's house, one and half mile to the South of mine, the shock is described as having been more violent than it was felt at my house, or to the North side of it.* * * * * Your sincerely,

To R. Baird Smith, Esq.

A. CAMPBELL.

I have had frequent cause to be indebted to Dr. Campbell for details of Earthquakes experienced at Darjeeling, and I take this opportunity of acknowledging my obligations to him, not only for the assistance he has afforded me, but also for the general interest he has taken in the subject.

Correcting the time at Patna for difference of longitude, and assuming that observed at Darjeeling to be, have

	h.	m.	s.
Time of shock at Patna, ..	8	48	40
Time ,, at Darjeeling,	9	10	00
Difference,	0	21	20

4. EARTHQUAKE OF THE 4TH JULY, 1842.

A report of an Earthquake on the 4th July, was communicated to me by Sergt. Buttress, Overseer on the Delhi Canal, through Capt. Baker of Engineers. No other notice of this Earthquake has reached me, but Sergt. Buttress gives the details so circumstantially, that I can scarcely think he was mistaken, and the fact of his being the only one to communicate an account of it, is in no degree remarkable, since the interest in natural phenomena generally is in this country confined to a very limited circle, and numbers of these pass without any record at all. On the authority of Sergt. Buttress' letter, I therefore include this Earthquake in the Register.

Letter from Sergt. Buttress to Capt. Baker, Engineers, without date.

SIR,—As some gentleman of Engineers, whose name and address I have forgotten, has solicited information of any Earthquake that may take place, I beg leave through you, Sir, should you be acquainted with the name and address of the gentleman, to forward the following notice of one that took place at Chotah Thannah, on Monday the 4th of July, at 10 minutes to 3 o'clock P. M. by my watch, which I have since ascertained by the mid-day gun at Delhi, to be five minutes too slow, so that the time was five minutes to 3 o'clock.

It lasted about thirty seconds, and was accompanied by a rumbling noise, exactly like one of the water mills in Delhi. The motion was a violent trembling, and the direction seemed to me to be from West to East. The whole day had been dreadfully close, and scarcely a breeze blowing; but in the evening the wind rose, and has been very fresh. From yesterday up to the present moment, a dust storm has been blowing from the North-west. I have, &c. &c.,

W. BUTTRESS, *Sergt.*

Ovr. C. D.

5. EARTHQUAKE OF THE 21ST JULY, 1842.

The Earthquake of the 21st July was experienced at Jellalabad, and the following extract from the *Agra Uthbar* of the 4th August, gives the only notice of it that has appeared. "A severe shock of an Earthquake was experienced at Jellalabad on the 21st July 1842, at a little

past 9 p. m. A reduction of temperature followed it." I am not aware whether or not this shock extended beyond the valley of Jellalabad. The perceptible reduction of temperature which followed it, is the only point of interest connected with this shock.

6. EARTHQUAKE OF THE 25TH JULY, 1842.

The immediate vicinity of Delhi alone, appears to have been affected by the shock of the 25th July. How far its effects may have extended, there are no precise data for determining, but it was evidently a merely local convulsion, and probably was felt only within fifteen or twenty miles around the city. The following Extract from the *Delhi Gazette* of the 27th July, gives an account of the phenomenon :

“A smart shock of an Earthquake, accompanied by a loud rumbling noise, woke the inhabitants of Delhi from their sleep at about a quarter to four on the morning of the 25th. It did no damage that we have heard of.”

7. EARTHQUAKE OF THE 7TH SEPTEMBER, 1842.

This Earthquake was experienced at Mussoorie in the Himalayas. The shock was very slight, and occurred during a severe storm at 1h. 58m. p. m. The nature of the Earth's motion was vertical, and the vibration single. The direction appeared to be from West to East, the duration of the shock was estimated at five seconds. It was not, to the best of my knowledge experienced in the Deyrah Dhoon, or any where in the Plains, as might have been anticipated from the slightness of the shock at Mussoorie.

Having been informed that at the moment of the occurrence of this Earthquake, Dr. Anderson of the Horse Artillery, had experienced sensations precisely similar to those accompanying an electric shock, I felt anxious to verify this interesting fact, and accordingly wrote to Dr. Anderson on the subject, who obligingly favoured me with the following reply :—

Letter from F. ANDERSON, Esq. to my address, dated Mussoorie, 21st November, 1842.

MY DEAR SMITH,—I certainly thought that at the time of that slight Earthquake, with the movement, that I also experienced a slight electric shock extending from the left elbow to the fingers. I was then up at "Rochville," at the very extremity (East end) of Landour. I was in the room with Mundy and two ladies, one of whom I was seated close to, she and I felt the movement distinctly, the others did not. *I alone* was conscious of the electric feeling. * * * * *

Yours very sincerely,

F. ANDERSON.

Electric shocks frequently have been felt during Earthquake shocks, and it is interesting to find this phenomenon accompanying such event in India, as well as elsewhere.

8. EARTHQUAKE OF THE 18TH SEPTEMBER, 1842.

The Earthquake of the 18th September was experienced at Darjeeling, and from that station only has any notice of it reached to me. The following extract from a letter from Dr. Campbell, furnishes details of the shock as experienced at Darjeeling:—

"On the morning of the 18th September, 1842, at half-past 4 o'clock, as nearly as I can determine from the comparison of watch times given by three gentlemen with the time by sun-dial and their watches on the following day, there was a smart shock of Earthquake felt at Darjeeling. Two of those gentlemen, who have given me particulars of their sensations, say, that it appeared to them to have come from the North-west and passed under them to South-east. The third says, he felt it as an "up and down" shock, and that the movement of the earth was sensible for some seconds after it was evident that the shock had passed."

Assuming the direction stated to be correct, it is not improbable that this shock emanated from the valley of Nepal, the seat of the great Earthquake of 1833. But this of course is merely a conjecture, as evidence is wanting to warrant more.

9. EARTHQUAKE OF THE 26TH SEPTEMBER, 1842.

This shock was experienced at Delhi, and like that of the 25th July, appears to have been strictly local in its character. It is described as "a very smart shock of an Earthquake, accompanied by a tremendous rumbling, and lasted not less than two or three minutes." It occurred about 9 A. M., and Mr. Bingham informs me, its direction was apparently from W. to E.

10. EARTHQUAKE OF THE 27TH SEPTEMBER, 1842.

The vicinity of Delhi was the seat of this Earthquake also, which was slight in its character, and came in the same direction as the preceding. Beyond the movement of the Earth, no other effects were perceptible.

The repeated local shocks to which the neighbourhood of Delhi is subject, prove distinctly, that a focus of active Earthquaking force is situated close by it. And in looking for the locality of this, I have no hesitation in fixing it in the Aravulli range of hills which skirt Delhi, and run in a South-westerly direction from it. The occurrence of the hot springs at Loweah, the disrupted state of the rocks composing the range, the occurrence of secondary trap in abundance, all shew that disturbing forces have existed, and still do exist there. I am confirmed in this opinion, by the result of Mr. Bingham's observations, who has informed me, that all the different local shocks of Earthquake experienced in Delhi, appeared to him to emanate from this range of hills. The limited extent over which the shocks are felt, shews, that the seat of the disturbing force cannot be far from the surface of the earth, while their comparatively feeble intensity proves, that the force itself cannot be of a very energetic character. I shall have occasion in a subsequent part of this memoir to shew grounds for inferring, that its effects being the standard of comparison, the disturbing force has diminished perceptibly in energy within the last few centuries. To say whether the force emanates from a central point, or whether it acts on a line of some extent is impracticable, with observations indefinite as those hitherto furnished; but if instruments for recording Earthquake shocks are ever employed in India, Delhi ought to be one of the places

selected for establishing them at, and from their indications these and other points of interest may be determined.

11. EARTHQUAKE OF THE 23D OF OCTOBER, 1842.

This Earthquake was experienced at Gowahatty, Assam, in lat. $26^{\circ} 00'$ N. and long. $90^{\circ} 40'$ E., and at Chittagong in lat. $22^{\circ} 22'$ N. and long. $91^{\circ} 42'$ E. At the former place its effects are thus described by a correspondent of the *Friend of India*: "Oct. 23. Between 8 and 9 o'clock A. M. there was a shock of an Earthquake; the motion was tremulous, and lasted about half a minute." From Chittagong another correspondent of the same paper writes: "we had another Earthquake here; not so severe as the last on the 23d ultimo. The motion was in the opposite direction (*i. e.* from East to West) and stopped one of the above-mentioned clocks which vibrate N. and S. at 9h. 42m. A. M."

It is stated that most, if not all, of the Earthquakes experienced in Assam came from the Eastward. It is therefore probable, that a centre of active force is situated somewhere here in the Singhpho or Eastern extremity of the Naga hills, which bound the province on the East. I am too imperfectly acquainted with the localities in question to be able to say whether there are any physical or geological facts that throw light upon this idea, and it is suggested only by the uniform regularity of the direction of the shocks.

12. EARTHQUAKE OF THE 25TH OF OCTOBER, 1842.

This was experienced at Jellalabad at half-past 1 A. M. It is characterised as severe, but it appears to have been one of the local shocks so frequently felt throughout the valley in which that city stands.

13. EARTHQUAKE OF THE 29TH OF OCTOBER, 1842.

The Earthquake of the 29th of October was felt at Gowahatty, Assam, and forms an exception to the general rule as regards direction before stated, since the vibrations travelled from North to South. The correspondent of the *Friend of India*, before quoted, thus describes

the shock : " October 29th. At half past 7 P. M. a second shock occurred. The motion was from North to South, as appeared by the liquids in decanters on the dinner table. The shock was gentle, and the motion lasted about half a minute, when it was gently repeated."

14. EARTHQUAKE OF THE 6TH OF NOVEMBER, 1842.

This was another of the local Delhi shocks, and was experienced at 1h. 30m. P. M., on the 6th November. Mr Bingham in communicating its occurrence to me remarks, that it makes the eighth shock experienced in Delhi during the year. Five of these are recorded in this Register, two occurred before it was commenced, and the eighth was probably that of the 5th of March, although no notice of its having been felt there has reached me. Out of these eight, six were local and primary shocks, emanating from a focal tract in the immediate vicinity of the place, while the remaining two were secondary, and transmitted from distant and distinct centres.

15. EARTHQUAKE OF THE 11TH OF NOVEMBER, 1842.

The Earthquake of the 11th of November, one of the severest that had been felt for years, was confined in its influence to the Lower Provinces. Its effects at Calcutta will first be detailed, and its course then traced Eastward and Westward from that place.

I place the following Extract from a letter from H. Piddington, Esq. first among the notices of the shock at Calcutta, because it furnishes the most accurate and trust-worthy information relative to the period and direction of the shock as experienced there. The time, as given by Mr. Gray, namely 9h. 38m. P. M. will be assumed for comparison with the times at other places, and these will all be reduced to Calcutta time.

*Extract from a letter from H. PIDDINGTON, Esq. to my address, dated
24th November, 1842.*

" I learn from the watchmakers (Mr. E. Gray, the first in his profession here,) that the true time of the shock was 9h. 38m. Its direc-

tion, from the swinging of pendulums, was from about E. N. E. to W. S. W. If I hear any thing more, I shall not fail to note it for you, and I add at bottom a copy of our note made at the meeting. I was acting as Secretary for Mr. Torrens, and it did not occur to me to examine the Barometer; but I found no difference afterwards at home, and a friend who has an excellent simpiesometer assures me, that no effect was produced upon it, he having examined it immediately afterwards, so that in slight shocks the atmosphere seems to have no share.

Yours very faithfully,

H. PIDDINGTON.

The note alluded to above by Mr. Piddington, as having been made at the meeting of the Asiatic Society, is as follows: "At ——* the proceedings of the Society were interrupted by two or three slight vertical shakes or heaves of the Earth, with a noise like the rumbling of a passing carriage, and one strong horizontal shake from East to West, or from N. E. to S. W. The whole took place within about a minute of time." (Signed) H. T. PRINSEP, *President.*

The following extract from a letter from J. McClelland, Esq., gives some further details of interest, and shews that the Barometer was seriously affected during the shock: "With regard to the Earthquake of the 11th November, the only information I am able to give you that has not appeared in the Calcutta papers is, that the mercury rose and fell repeatedly, to the extent of seven or eight tenths of an inch during the shocks in a Barometer on the second floor of St. Xavier's College, a house in Chowringhee. The inmates of which house also describe the water in a large pond, of about three hundred yards in length and seventy in breadth, extending lengthways North and South, to have risen into considerable waves. This was also the case with the River, which appeared agitated, as if a steamer had passed. This refers to the river at the Botanic Gardens, where it is not half so broad as it is at Calcutta. A clock in the house of the Superintendent of the Garden, which had gone regularly for years, stopped suddenly during the shock. I observed three distinct shocks, they seemed to me to be rather a tremulous motion than a waving in any one direction; but

* Time omitted as erroneous.

others observed a distinct direction of the shock ; however, people are not all agreed as to what this exactly was. Probably the form of different masses of building, such as our houses in Calcutta, might occasion some little difference in the effects of the Earthquake on the sensations of different persons."

A remarkable luminous appearance of the water in the river, as observed on board the ship *Southampton*, is thus described by a correspondent of the *Englishman* of November 14th.

"Several gentlemen had just before the time been conversing upon the poop, when one pointed out the very singular luminous appearance of a portion of the river water : its Southern limit setting from N. W. towards Chaudpaul Ghaut. It was thought at first to be merely the first ebb of the tide setting down, or from the reflection of the moon, but it proved in the sequel not to be the first, and the moon was just then densely obscured by clouds, proving that also not to be the cause. On this brightness closing upon the ship, a general and severe tremor was felt throughout, as if a taut chain cable was grinding under the keel, or that a sudden squall had struck the ship. The Barometer had slightly fallen previous to this, whether from the preceding rain or caused by the Earthquake it is for others more capable to judge : I am inclined to think from the latter. From enquiries amongst several commanders, it appears, that amongst the northermost ships it was more severely felt, even to the shaking of the chain cables and cabin furniture.

"At Howrah also, we find the shock was violent in the extreme. We may therefore infer that the direction of the Earthquake must have been from N. W. to S. E."

It is stated by a correspondent of the *Englishman* of the 14th Nov., the night of the 11th was particularly close and oppressive in Calcutta. The meteorological registers kept at the Surveyor General's Office and the Honorable Company's Dispensary, present nothing remarkable farther than that rain fell on the evening of the 11th to the amount in the lower gauge of 0.14, and in the upper of 0.19 inches, none having fallen for sometime before.

The effects of the Earthquake at Serampore, about fourteen miles above Calcutta, (lat. 22° 45' N. long. 88° 26' E.) are described in the following extracts :—

In the *Friend of India* of the 17th Nov., it is stated in the weekly summary of events, that on the evening of the 11th Nov. at about 9h. 50m. or 9h. 45m. by the town-clock, a very severe shock of an Earthquake was experienced at Serampore. "It was accompanied by a noise which at first resembled some "mighty rushing wind," and then the loud rattling of carriages over a stony street. The shock came from the Eastward: the clocks of which the pendulums vibrated from North to South were stopped, while those which stood East and West continued going. So violent a shock has not been experienced in this part of the country for the last twenty-five years. There was an unpleasant stillness in the air previous to this occurrence, but the wind rose strongly from the Eastward almost immediately afterwards."

In the *Bengal Hurkaru* of the 14th of Nov. the following details are given: "On Friday the 11th instant, at about a quarter before 10 P. M. two severe shocks of an Earthquake were felt at Serampore. They were preceded by a rumbling noise from the N. E. towards S. W.; the undulation was very great: all the houses at the place were shaken, and those persons who had retired were obliged to jump out of their beds, and some even quitted their houses, but through the mercy of Providence, no injury was done. The Brahmans as usual were busy with their shauncs and drums. The Earthquake lasted about four or five seconds."

In the other notices of the shock at Serampore which I have received, there are no new facts, so that I do not insert them. The time stated above is, I believe, incorrect, and considerable difference of opinion exists as to the duration of the shock. Such difference always will exist, so long as mere sensation is made the measure of duration, and proper instruments alone can remedy this imperfection.

Darjeeling is situated within one minute Eastward of the meridian of Calcutta, and I therefore give next, a notice of the shock as felt there. For this I am indebted to Dr. A. Campbell.

Letter from DR. CAMPBELL to my address, dated Darjeeling, 18th November, 1842.

"On the night of Friday the 11th instant, we had a shock of an Earthquake at this place. Although not in bed or asleep at the time it occurred, I was not conscious of it. Still it was, a smart shock, accord-

ing to the accounts of those who experienced it. The ghurree at the Treasury Guard struck 10 o'clock, as the shock was felt by many persons, and one gentleman looked at his watch and found it was ten minutes past 10 P. M.—suppose, as there is no way of getting the exact time of the shock's occurrence, that it happened at 5 minutes past 10 P. M. It was so severe as to bring down pieces of plaster from the walls of "Caroline Villa" and "Mount Pleasant;" and *the* shock was succeeded soon after by a slighter one, or perhaps it was but one shock with a remission in the vibration. One person thought it came from the South and passed on to the North. I account for the shock not having been felt at my house where there was a party of seven at the time, from its being constructed of wood, which from its greater elasticity is not to be shaken to the same extent as a pile of bricks or stone.

Yours, &c. A. CAMPBELL.

The following extract from the *Englishman* of the 16th Nov. details the effects of the Earthquake as experienced at B——, a place fifty-five miles East of Calcutta.

"Arrived at B—— (fifty-five miles East of Calcutta on the Isamutta or Jaboona) at half-past 5 A. M. 12th Nov. and found Mr. —— and his family still in great alarm from the Earthquake, which they had experienced there on the previous night. Mr. —— told me that immediately his family had retired at half-past 9, his dogs and those of the neighbouring village began howling, and shortly after was a loud rumbling, similar to that of carriages going over a draw-bridge. The commencement of this was followed by a violent undulation of the ground from North to South which actually rocked the house, and ended by three or four hard shocks which threw open all the doors and windows previously shut in for the night. The house (a puckah-built upper-roomed one) cracked, and the plaister from several of the walls and ceilings was thrown down. On examining the house by daylight we found rents in several of the walls and arches of the house, and the verandah to the East separated from it. Mr. —— considered the Earthquake, from the first hearing of the rumbling noise to the last shock, to have occupied about one minute of time.

I was on the road to B —— in my palkee, in the first stage from Barraset, and did not feel the Earthquake, but I noticed at 8 P. M. to

my wife who was with me, that the weather was unusually warm, cloudy and threatening heavy rain: she called out to me about half past 9, that it thundered, and we had heavy rain on the road from half past 8 P. M. to 2 A. M.

It did not rain at B — during the Earthquake, but it did so the preceding afternoon from 3 to 5 o'clock, and the weather all day had been sultry; the same was experienced in Calcutta.

Mr. — 's Pundit arrived at B — at 10 A. M. on Saturday the 12th. He was in a boat in the Soonderbuns, and stated that the waters were much agitated, and his boat was tossed about as if by waves in a squall of wind."

The Editor of the *Englishman* appends to the above the following note:—

"We learn from another quarter, that the shock of the Earthquake was severely felt on board the *Agincourt*, about fifty miles South-east of the Floating Light at 9h. 30m. A. M."

At Acra on the bank of the Hooghly, about five or six miles below Calcutta, the shock seems to have been very severe. The house of Mr. Greenfield there is represented as having been rent from top to bottom in twenty different places. He states, "it was so severe that the doors rattled so that you could not hear yourself speak, and the mortar from one end of the house to the other was flying down in handfulls. We had four shocks, three first and one about a quarter of an hour afterwards: empty bottles were broken at the mill, and the pigs and fowls, ducks, geese, dogs and horses made a most hideous noise. A little more and all would have been down, as the beams began to start."

At Pubnah (lat. 24° 32' N. long. 89° 12' E.) the shock was experienced at 9h. 47m. Calcutta time. Another slight shock occurred at 10h. 30m. C. T. The direction here was from S. W. Two indigo boiler chimneys and that of a rum distillery were thrown down, and the banks of the river in front of the distillery are said to have been fissured. The correspondent of the *Englishman*, however, who gives these details of the effects of the shock, is so remarkably facetious, that suspicions of exaggeration are excited.

At Barrisaul (lat. 22° 45' N. long 90° 11' E.) the shock appears to have been felt at very nearly the same time as at Calcutta, the period being 9h. 38m. 12s. C. T.

The following letter published in the *Bengal Hurkaru*, gives an account of the Earthquake as experienced at Barrisaul :—

“As I dare say that the shock of Earthquake which was felt here will have been likewise experienced at other stations with more or less severity, accounts of which will doubtless be communicated to you, I lose no time in telling you now, that a very severe shock was felt at a quarter to 10 P. M. at this station yesterday (Nov. 11th); although no accident occurred, considerable anxiety was caused by the length of time the Earthquake lasted. The heaving of the ground appeared to travel from E. to W. and continued with violence for about one minute. The river was greatly agitated, so much so, that the serangs of several pinnaces came on shore, unable to account for the extraordinary motion of the water.

“I send down this account, because I imagine that an Earthquake of such severity having been felt at a place where its occurrence is so unusual must have extended elsewhere, and all information on the subject may prove interesting.

“P.S.—The weather for the last few days has been remarkably warm for the season of the year; the variation in the Barometer has not been great. The Earthquake was accompanied by a rumbling noise, similar to that caused by heavy ordnance passing over the ground.”

At Gowahatti, Assam, (lat. 26° 00', long. 90° 40' E.) the shock was felt very slightly. Its period there was 10h. 00m. 56s. C. T. A correspondent of the *Friend of India* describes the motion as merely tremulous, but sufficient to attract the attention of four persons who were seated together at the time.

The shock was felt more severely at Chittagong, (lat. 22° 22' N. long. 91° 42' E.) probably because it had to traverse only alluvial lands, and had no mountainous tracts, as in Assam, to decrease its force. The period as given by two tolerably correct clocks, was 9h. 42m. 48s. C. T. The direction of the oscillation was from North to South, as determined by the motion of hanging lamps, &c.

The only place at any distance to the westward of Calcutta, whence any notice of the shock having been felt has reached me, was Monghyr (lat. 25° 02' N. long. 86° 29' E.) where a portion of the fort wall is said to have been brought down. No farther particulars have come under my observation, and I am unable to state either the time or direc-

tion of the shock at that place. At Baughulpore (lat. $25^{\circ} 13'$ N. long. $86^{\circ} 58'$ E.) I am informed by Mr. Piddington, that the shock was *not* felt.

It therefore appears that, *in so far as the facts collected extend*, the tract affected by the Earthquake of the 11th November 1842, was bounded on the North by Darjeeling, on the East by Chittagong, on the West by Monghyr, and on the South by the position of the ship *Agincourt*, thus including about five degrees of longitude and five of latitude. That to the Eastward and Southward, and probably to the Northward also, the shock extended beyond the limit here assigned, can scarcely be doubted, from its intensity at the places specified as the bounding points of the tract in these directions, but there is no information available to prove that it did do so, and I am unwilling to venture upon conjecture.

It will have been observed, that at different places the shock appeared to travel in every different direction. Thus:—

At Calcutta,		from E. N. E. to W. S. W.
At Pubna,	„	from S. W. to N. E.
At Darjeeling	„	from S. to N.
At Chittagong	„	from N. to S.

Now, it appears to me, that the only way in which these statements can be connected and rendered consistent, is to conceive the undulations of which the shock was composed, to have been propagated in a manner analogous to waves formed in water when a stone is thrown into it. Proceeding thus in all directions from a central point, the undulations would seem to observe to come from different directions, dependent on their position, relative to the centre whence the undulations had emanated. Of course waves propagated through the crust of the earth could retain but little of that perfect symmetry characteristic of waves in a homogenous fluid like water, since their forms would necessarily be modified by the variable nature of the strata through which they were being transmitted, and hence departures from strict theoretical accuracy of direction are to be anticipated. Assigning therefore a certain degree of *circularity* to the undulations of the Earthquake of the 11th Nov. and conceiving the centre of emanation to have been some little distance to the N. E. of Calcutta, it will be found that the observations on direction become to some

extent, consistent. At Calcutta the course would appear to be from N. E. to S. W.; at Pubna from S. E. to N. W. instead of from S. W., as stated before; at Darjeeling from South to North; and at Chittagong from the opposite direction. Some of the observations made, as at Barrisaul, do not correspond strictly with this view, but many sources of error exist when sensations are taken as the only guides, and by these it is possible the observations may have been affected. The idea of the circular propagation of the undulations is suggested only as a method of connecting the facts, and farther than it does so, I have no wish to claim any authority for it, the observations on which it is founded being too indefinite generally, to warrant this being done.

16. EARTHQUAKE AT BARODA, 1842.

I regret that I have been unable to ascertain more regarding this Earthquake than that it occurred during the year 1842. I am therefore able only to record it, a circumstance I regret the more, as Baroda lies in the usual track of the Earthquakes of the Delta of the Indus, and it would have been interesting to ascertain, whether this shock had emanated from that focus, or was independent of it.

The Register is now completed, and I defer all comment upon the phenomena of the Earthquakes recorded in it, until the completion of the second part of this Memoir, when the phenomena of Indian Earthquakes generally, will be analysed.

Remarks on some of the disturbing causes in Barometric Observations. By Captain SHORTREDE, First Assistant, G. T. Survey.

If the barometric oscillations were perfectly uniform in different situations, it would obviously be a matter of indifference, theoretically, at what times of the day the observations might be made, provided they were simultaneous. But it is well known to those who have examined the subject, that the oscillations though tolerably uniform in low latitudes, are subject to particular variations, the causes of which are often not easily assigned. Whatever these causes may be, it is by no means likely that their effect will be transmitted in-

stantaneously through a long column of air, and hence it appears desirable, that the comparative observations should be made about the times of maximum and minimum of the atmospheric tide, when, the variations for a considerable time being almost insensible, it may be supposed that the causes will act with least disturbance. Another practical reason for selecting the times of maximum and minimum is, that perfect simultaneousness being seldom to be expected, it is evidently of advantage to select for observation those times at which the want of this condition will produce the least effect. About the middle of the tide, the barometer generally will vary as much in the course of five minutes, as it will in half an hour from the time of maximum or minimum.

Though these remarks seem true as far as they go, yet in particular cases, the atmospheric tides may be so affected by circumstances of locality, as to present anomalous results. I am unable at present to quote the documents containing the observations which gave occasion to what I am now about to state, but the results were so uniformly and repeatedly observed, that beyond settling the precise numerical amount of discrepancy, the possession of the original observations would add little to the evidence.

When I was in charge of the Bombay Trigonometrical Survey, I made many barometric observations in the Dekhan and along the Sea Coast. These were compared sometimes with those made at the Engineer Institution in Bombay; sometimes with the observations made by Colonel (then Major) Sykes at Puna; and sometimes with those of a barometer left in Puna for the purpose. All the observations on the Sea Coast compared with those made inland from the face of the Ghats, as at Puna agreed in one result, but I shall confine myself more particularly to the results of a special comparison for determining the height of Puna above the Sea.

One of my barometers had been repeatedly boiled, I believe upwards of twenty times, and it was so perfectly free from air, that when set up, the mercury used to adhere to the top of the tube six inches above the level at which it stood when shaken. The tube was full 32 inches long, and the mercury adhered to the top at a station upwards of 4000 feet above the Sea, where the proper height of the mercury was about 25.05m. This barometer was compared for several

days with one of Major Sykes' barometers, which I had filled and boiled, in which also the mercury used to adhere to the top of the tube. These two barometers used always to stand at the same height within a thousandth of an inch about the middle of the tide, but at the times of maximum and minimum, one of them used to range about two-thousands above and below the other. The difference to maximum and minimum being never less than '001, nor more than '003. We considered them to be the most perfectly comparable of any two barometers we had ever seen. Major Sykes' barometer remained on the spot where the comparisons had been made, while mine was carried to Bombay, and as the mercury still continued to adhere to the top of the tube, it plainly had not been deteriorated by the journey. Our observations were made simultaneously at 10 A. M. and 4 P. M. for several days successively, but on calculating them, I found that the 10 o'clock observations always gave the height of Puna about 100 feet more than was given by the 4 o'clock observations. I ascertained beyond doubt, that there had been no mistake of a tenth of an inch in registering the observed heights. The like discrepancy continued at several other stations along the Sea Coast. This discordance of result being unvaried, naturally set me to consider what might be its probable cause: and the only cause I have ever been able to discover at all likely to account for the fact, is in the effect of the Sea breeze, which at that season of the year begins to blow about 8 or 9 A. M. along the coast, while towards Puna it is not felt till about 2 P. M. After blowing over the low lands in the Konkan, it is intercepted about midway by the Seihadri Ghats, which presenting an almost perpendicular scarp of from 2000 to 3000 feet, cause the air to accumulate over the low land, thereby increasing its barometric pressure to an amount equivalent apparently to about a tenth of an inch of mercury, corresponding to a column of about 100 feet of air, somewhat similar to the *head of water* produced by an obstacle placed in its current.

I am aware that some persons may be disposed to treat this statement as of little authority, for want of the actual observations on which it is founded. The fact, however, is tangible, and may be submitted to proof or disproof by any one who chuses to make the necessary observations.

The purpose for which I have made the statement, is to call attention to the influence of locality as affecting the results of barometric measurements. Different places may have particular times, at which it is unsafe to trust to barometric observations for correct results.

As there seems reason to suppose, that the principal deranging causes in barometric measurements are connected with the sun and wind, I have often thought that probably the results by night observation may be found to be more consistent than those by day observations. Unless experience should shew a more favorable time, I should prefer observations made about the time of the morning minimum of the tide, because so far as I have observed, the air is then more generally calm than at any other time. This, however, is a matter of fact, on which every one may judge for himself according to his means of knowledge.

I have been led to the same conclusion by endeavouring to trace the causes of the atmospheric tides, which I am disposed to refer entirely to the direct or remote action of the sun. The following is offered as an attempt to trace this action, and though perhaps not altogether satisfactory, it may lead to something better.

When the sun rises over China, the atmosphere there getting heated, expands and begins to flow off towards the west, where the sun is exerting no heating power. As the solar heat increases, the western efflux of atmospheric air increases, and goes on increasing till the sun is past the meridian. When the sun rises over India, a similar western efflux is occasioned, but for some considerable time the influx from the eastward being greater than the efflux towards the west, the atmospheric pressure goes on increasing, till by and by, the direct heating effect over India causes a western efflux at first equal to, and then greater than, the influx from the eastward. The atmospheric pressure thenceforward decreases, and it goes on to decrease so long as the heating power of the sun causes the air to expand. At the surface of the earth, this effect is greatest about 2 or 3 P. M., but it is not till the heated atmosphere has had time to ascend and dislodge colder air that the total effect is greatest. The atmospheric pressure is then a minimum. When the sun is exerting its greatest power over India, it has ceased to heat the countries to the eastward: the air over these countries being colder, presses on that over the countries to the west-

ward, which is specifically lighter, until the air here being similarly cooled in like manner, proceeds to press on and displace the warmer air to the westward. When the influx balances the efflux, there is the evening maximum: after which the accumulated air gradually disperses itself till towards morning, when it is again pressed on before sunrise by the air heated in the east.

If this be a true account of the atmospheric tides, it is plain, that supposing the air to be calm, we may expect the disturbing causes will be least about the time of the morning minimum; and that at any time during the night if the air be calm, these are likely to be much less influential than during the day, for then they are entirely free from the direct action of the sun, which evidently has a great effect on barometric heights by the inequalities of temperatures which it occasions in different places. We know that even in the hottest weather, the temperature on the Sea Coast is tolerably uniform when compared with that of places inland, particularly when these inland places are on elevated plains. In such cases we cannot safely assume that the mean of the temperatures at the two stations will truly represent that of the intermediate column of air: or perhaps, to speak more properly, it cannot be assumed that the temperature and moisture at the upper station will approximate to those of a place on the same level immediately over the lower station; besides which, the barometric pressure at the inland station may be very different from that at the supposed station on the same level if, as is most likely, the state of the wind should be different in the two places. In short, any thing analogous to wind or current which would affect the correctness of water-levelling may be expected in a still greater degree to affect the correctness of barometric-levelling: and we may infer as a general conclusion that, besides the goodness of the instruments employed, the trustworthiness of barometric measurements will greatly depend on the care and skill with which the observers avoid the influence of disturbing causes.

11th April, 1842.

On Barometric Heights. By Captain R. SHORTREDE, First Assistant Grand-Trigonometrical Survey.

If I remember rightly, your correspondent D has given a formula for computing Barometric heights, which to me appears to be neither so simple nor easy of recollection as that given by Professor Leslie, at the end of his Geometry; which is "As the sum of the mercurial columns is to their difference, so is the constant number 52,000 to the approximate height" in feet. This rule is easily remembered, and is not far from the truth; but a more correct result may be obtained by using 52,200 as the 3rd term. At the height of a mile the height thus found differs only nine feet in defect from that obtained by a logarithmic calculation, whereas by Leslie's rule the defect is twenty-nine feet. When the height does not exceed 4,000 feet, 52,200 gives within two feet of the logarithmic calculation. At elevations above a mile, the difference increases rapidly: it then becomes necessary, as Leslie recommends, to subdivide the interval into smaller portions.

The following Table shews the results of the several Rules.

Approximate Height by			
Barometers.	Logarithms.	52,200.	52,000.
30 and 29.5	438.0	438.7	437.0
... „ 29.0	883.4	884.7	881.3
... „ 28.5	1336.6	1338.0	1333.3
... „ 28.0	1798.0	1800.0	1793.1
... „ 27.5	2267.3	2269.1	2260.4
... „ 27.0	2745.4	2747.4	2736.8
... „ 26.5	3232.5	3233.6	3221.2
... „ 26.0	3728.9	3728.6	3714.3
... „ 25.5	4234.9	4232.4	4216.2
... „ 25.0	4750.9	4745.5	4727.3
... „ 24.0	5814.6	5800.0	5777.8
... „ 23.0	6923.6	6894.3	6867.9
... „ 22.0	8081.9	8030.8	8000.0
... „ 21.0	9294.1	9211.8	9176.5
... „ 20.0	10565.5	10440.0	10400.0

At 3700 feet by using 52,200 we get exactly the same result as by logarithms.

Leslie's rule is then in defect about 15 feet.

This rule may be thus expressed in words: "The sum of the barometric columns at the two stations is to their difference, as 52,200 to the approximate height in feet," and algebraically (B and b being the barometers at the 2 stations)

$$\left(\frac{B-b}{B+b}\right) 52200 = \text{Approximate height (A)}.$$

On the reduction of mean temperature by elevation, Professor Leslie has given the following formula as the result of his experiments on the cold produced by diminution of barometric pressure. If B and b denote the barometric pressure at the lower and upper stations; then will $\left(\frac{B}{b} - \frac{b}{B}\right) 25$ express on the Centigrade scale, the diminution of heat in ascent (B). This formula cannot be universally true, though it is known to give results agreeing very well with observation in moderate elevations. For if we suppose three stations A, B, C , in the same vertical line at which the barometer stands respectively at 30, 20, and 10 inches, it is obvious that the reduction of temperature between A and B together with that between B and C must be the same as the whole reduction from A to C . The formula gives $\left(\frac{30}{20} - \frac{20}{30}\right) 25 = 20.83$ as the diminution from A to B ; and $\left(\frac{20}{10} - \frac{10}{20}\right) 25 = 37.5$ as that from B to C : the sum of which is 58.33. But we have also $\left(\frac{30}{10} - \frac{10}{30}\right) 25 = 66.67$ as the reduction from A to C . This differs so much from the former result, that we may without any hesitation conclude that the formula cannot be strictly true. In order that the diminution from A to C may be equal to the sum of the diminutions from A to B and from B to C , it seems necessary to make it proportional to the ratio of the densities, or as the logarithm of $\frac{B}{b}$; that is, as the difference of the logarithms of the barometers at the two stations; and if we assume that Leslie's formula gives results not sensibly differing from the truth, at first, we shall have $115 \log. \frac{B}{b}$ to be marked (C) as the expression for the diminution of temperature on the Centigrade scale, or $207 \log. \frac{B}{b}$ to be marked (D) on Fahrenheit, which will give *consistent* results in all cases.* The diminution of temperature is thus proportional to the approximate height in barometric calculations, and if we calculate the approximate height corresponding to a reduction of 1 degree in temperature, we shall have 521.738 feet for 1° cent. and 289.86 feet for 1° Fahr., or in round numbers 522 for 1° cent. and 290 for 1° Fahr. at the temperature of freezing. The numbers 522 and 290 will require a correction for mean temperature, as in barometric measurements: This may be done very simply. The expansion on a column of air of 522 feet for 1° cent. is just about 2 feet, and on 290 feet for 1° Fahr. the expansion is 6 feet very nearly. Hence the corrected numbers may be found

* If necessary the co-efficient may be corrected so as to agree with observation.

as follows : To 522 add twice the number expressing the mean temperature in degrees cent., and we have the correct height corresponding to a difference of 1° cent. and on Fahr. multiply the mean temperature above 32 by 0.6 and add it to 290, the sum is the correct height giving a difference of 1° Fahr.

The following Table may be convenient for reference.

Mean Temp. Cent.	Height for 1°.	Mean Temp. Fahr.	Height for 1°.
0	522	30	289
5	532	32	290
10	542	40	295
15	552	50	301
20	562	60	307
25	572	70	313
30	582	80	319

I may perhaps have occasion to refer again to this subject.

There is a formula for finding the approximate height in barometric operations of the same general form as that of Leslie, for diminution of temperature. The formula is $\left(\frac{B}{b} - \frac{b}{B}\right) 13050 = \text{Approx. Ht.}^* \text{ (E)}$ The co-efficient in this formula is half the height of the equiponderant column. The co-efficient of formula (A) before given is 52,200, being double the height of the equiponderant column, or just 4 times the co-efficient of formula (E). Now as in Leslie's formula the co-efficient is 25 cent. or just $\frac{1}{4}$ of the interval from freezing to boiling, we may therefore transform it into another of the form (A) and it becomes $\left(\frac{B-b}{B+b}\right) 100 = \text{diminution in degrees cent.}$ or $\left(\frac{B-b}{B+b}\right) 180 = \text{diminution in deg. Fahr.}$ which may be thus expressed: "The sum of the barometers at the two stations is to their differences, as the No. of degrees in the interval from boiling to freezing is to the diminution of mean temperature by ascent." This rule will give results not sensibly differing from those of the logarithmic formula (C and D) at intervals of 4000 feet, or even at a mile.

* The formula, $\left(\frac{B}{b} - \frac{b}{B}\right) 13,000$ and $\left(\frac{B-b}{B+b}\right) 52,200$, for the approximate height, are only close approximations to the truth, and are not absolutely identical: the former errs in excess, and the latter a little in defect. If they were absolutely identical, we should have $\frac{B}{b} - \frac{b}{B} = 4 \frac{B-b}{B+b}$, or $\frac{B-b}{B+b} = \frac{B^2 - b^2 (B+b) (B-b)}{4Bb}$, from which by transposition and division we get $4 B b = B^2 + 2Bb + b^2$ hence $2 B b = B^2 + b^2$, which however do not differ much from the truth when B and b are nearly equal.

*Catalogue of Nepalese Birds presented to the Asiatic Society, duly named and classified by the Donor, Mr. HODGSON, [and revised by the Society's Curator].**

1. [*Spizaëtus* (Vieillot, as recognised by Messrs. Jardine and Selby, *Ill. Orn.* pl. LXVI) *grandis* : †] *Nisaëtus grandis*, Hodgson, [*J. A. S.* V, 230 ;] (aberrant species :) [*Nisaëtus niveus* ? Jerdon, 'Madras Journal,' No. XXIV, 69, ‡ (as identified from a specimen presented to the Society by that gentleman ;) but not *Falco niveus*, Temminck, which is *Nisaëtus Nipalensis*, Hodgson, *J. A. S.* V, 229, and apparently also the *F. caligatus*, Raffles, *Lin. Trans.* XIII, 278, wherein the statement that it measures "more than three feet across the wings" would seem to be a misprint for five feet : the latter species, *i. e.* *niveus* (aut potius *caligatus* ?) is not uncommon in Lower Bengal, adults having the under-parts very handsomely streaked with deep brown or brownish-black, of which but slight or sometimes no traces occur in the young ; one adult female which I have obtained, that was paired with a mate of the ordinary colour, being wholly dusky-black, with an ashy tinge on the upper-parts ; its brilliant golden irides contrasting finely with the blackish hue of the plumage.

The *Sp. grandis* varies much in colouring according to age, and somewhat even at the same age ; wherefore, as Mr. Hodgson's des-

* *Vide* XI, 778.—It was the wish of Mr. Hodgson that this Catalogue should have been published immediately, but this could only have been done in a very crude and imperfect manner, and the delay is more than compensated by the suppression of a host of unpublished synonyms, which would otherwise have required to be subsequently reduced. I have also had to find up the various scattered descriptions by Mr. Hodgson, and to collate the synonymy of many of the species, besides drawing up descriptions of several new species, — altogether no inconsiderable labour. Moreover, the delay has enabled Mr. Hodgson to improve the nomenclature considerably, both as regards the institution of some necessary new genera, and the specific appellations of certain of the new species.—E. B.

† Since writing the above, I have strongly inclined to the opinion that this is the *Aquila Bonelli*, of which I have no good description to refer to. *A. Bonelli* is included in Mr. Vigue's list of birds procured in Kashmir and little Tibet, *P. Z. S.* 1841, p. 6, the present species, besides being quite crestless, has the cere of an *Aquila*, and not of a *Spizaëtus* ; but its irides are bright yellow, as in the latter group, and the general form also inclines more to the latter.

‡ *Vide* also Elliot, in No. XXV, p. 234, of the same publication.

cription of this fine species was drawn up from a single specimen, being the only one that he had then obtained, it is quite necessary to describe it anew, in its different phases.

Length of an adult male twenty-seven inches, by sixty inches in spread of wing (Hodgson); of a female, eighteen inches (Elliot). The closed wing, in a series of seven specimens before me, varies from seventeen inches and a half to twenty inches and a quarter, and the tail from eleven inches to twelve inches and a half; but the greater number approach to the respective former of these dimensions: from point of upper mandible to gape measures about two inches, more or less; tarse about three inches and a half: the talons large and formidable.

This bird approaches somewhat in form to the true *Aquilæ*, and is distinguished from its congeners by the absence of all trace of the usual occipital crest. Adults deep aquiline-brown above, the somewhat lanceolated feathers about the nape laterally margined with whitish, or, in some, with pale brown: tail more or less greyish, and crossed with about seven narrow dark bars, in addition to the subterminal one which varies much in breadth: under-parts pure white, with a narrow dark brown mesial streak to each feather; the tibial plumes chiefly deep brown, freckled with whitish; and the under-coverts of the wings dark brown. Bill plumbeous, its tip and the talons black; cere and toes pale waxy-yellow; irides bright yellow. The mesial stripes on the feathers of the under-parts incline to be broader in the female, and are more developed on the belly, where in some the dark brown colour predominates, spreading in bars over the feathers; under tail-coverts also more or less distinctly banded: some specimens shew the white bases of the feathers very conspicuously about the nape: the inner webs of the tail-feathers are prettily mottled, more especially in adults, as also those of the primaries anterior to their emargination; underneath, the tail is albescent, and its bars are more or less obliterated, with the exception of the terminal one when broad. The young have the lower parts deeply stained with ferruginous (more or less so), and the mesial stripes to the feathers narrow and inconspicuous, scarcely occupying more than their shafts; tibial plumes the same, though in some there are traces of the marking on those of the adult; and the fore-part of the under-surface of the

wing is also similar, or nearly so, having at most a dark patch on the under-coverts of the primaries: above, the general cast of colour is merely paler than in the adult, the deeper hue of the latter being confined to near the tip of each feather and along the shaft, whereas in adults it spreads nearly to the edge: and the tail appears more closely barred, with blackish or deep brown upon a pale ground-hue.

The Crestless Eagle-hawk (as this species may be appropriately termed) appears to be generally, though sparingly, diffused over the wooded districts of the mountainous parts of India, while on the Himalaya it would seem to be not unfrequent. It hunts more on the wing than its congeners, in conformity with its structural approximation to the true Eagles. Mr. Jerdon observes, that it is certainly a rare bird in Southern India; and Mr. Elliot, that it "is the noblest of the Indian Eagles, being seldom seen, and then generally at a great height in the air, in wild and savage places. It preys on the Hare — I once saw a pair of them hunting in company, which nearly surprised a Peacock, pouncing on him on the ground." This gentleman remarked its distinctness from the *Falco niveus* of Temminck, to which Mr. Jerdon dubiously referred it. The latter does not hitherto appear to have been met with in Southern India, though tolerably common in Bengal, and also in Nepål.

2. [*Hæmatornis undulatus*, Vigors, *P. Z. S.* 1831, p. 170; Gould's *Century*, pl. I.] *Circæetus Nipalensis*, Hodgson [*As. Res.* XVIII, pt. II, p. 17 (published 1833)], this bird being clearly a *Circæetus*. [*Falco bido* (?), Horsfield, *Lin. Trans.* XIII, 137 (1821!): *Buteo bacha* (?), apud Franklin, *P. Z. S.* 1831, p. 114; and *Hæmatornis bacha* (?), Sykes, *Ibid.* 1832, p. 79. When this species was characterized by Mr. Vigors, "the three species of the group (*Hæmatornis*, Vigors,) were exhibited; their general similarity in colour and markings pointed out; and their specific differences explained. These consist chiefly in size; the *H. holospilus*" (*P. Z. S.* 1831, p. 96, from Manilla,) "being one third smaller than" (the African) "*H. bacha*; while *H. undulatus* considerably exceeds the latter. The first is spotted all over the body, the second only on the abdomen; while the third is marked by spots on the wing-coverts, and by *ocelli* bearing an undulated appearance on the abdomen, the breast also being crossed by

undulating *fasciæ*." A common species in Bengal, as in India generally.]

3. *Pandion* [*haliaëtus* : diffused in suitable situations throughout India.

4. *Ichhyaëtus Horsfieldi* : *Falco ichhyaëtus*, Horsfield:] *Haliaëtus plumbeus*, Hodgson [mentioned in *J. A. S.* VI, 367. Not uncommon in Bengal. The spotted first plumage of this bird much resembles the corresponding garb of the common Indian Kite (*Milvus cheela*); and in its next dress the basal portion of the tail is brown, more or less barred above.

A second species presenting the same characters is the *I. nanus*, Nobis, *J. A. S.* XI, 202. It is distinguished by its very inferior size, the closed wing measuring but fourteen inches in length. The only specimen I have seen was received from Singapore, being clad in worn nestling plumage, whereof the terminal pale spots had almost disappeared; and there is a considerable admixture of white on the new feathers growing on the under-parts, forming central streaks on the plumage of the abdomen. The fully adult garb would probably much resemble that of the preceding species. It appears to me that the term *Ichhyaëtus* should be restricted to these birds with smooth talons, like those of an Osprey; and that the *Ichhyaëtus leucogaster* of Gould's magnificent 'Birds of Australia' (the *Falco leucogaster*, Latham), which scarcely, if at all, differs from the Indian *Haliaëtus blagrus* except in its much superior size, should be retained in *Haliaëtus*, wherein Mr. Gould had already classed the young as *H. sphenurus* *P. Z. S.* 1837, p. 138), as I formerly arranged a specimen of *H. blagrus* (in second plumage), by the appellation *Ichhyaëtus cultrunguis*, *J. A. S.* XI, 110.

The truth is, that after *Haliaëtus* has been dismembered by the detachment of *Ichhyaëtus*, Lafresnoy, there still remain three marked natural divisions of the genus, which are as follow:—

A. The typical form, as exemplified by the European *albicilla* and North American *leucocephalus*, and to which the Indian *H. Macei* and some others likewise appertain. This last mentioned bird is the *H. albipes*, Hodgson, *J. A. S.* V, 228; and the young in first plumage is the *H. lineatus*, Gray, and in second plumage the *H. unicolor*, Gray, of Hardwicke's Illustrations.

B. The wedge-tailed group, exemplified by *H. leucogaster* and *H. blagrus*; referred by Gould and since by myself to *Ichthyætus*, but, as I now think, erroneously.

C. The diminutive group with comparatively feeble talons, exemplified by *H. Pondicerianus* (the *Brahminee Cheele* or *Sunkur Cheele* of India), and the Australian *H. leucosternus*, Gould, *P. Z. S.* 1837, p. 138. To this division Mr. Gould has since applied the term *Haliastur*.

Ornithologists in this country should seek to obtain the *Ichthyætus nanus*, which most probably will be found to occur.

5. *Spizaëtus pulcher*;] *Nisaëtus pulcher*, Hodgson, [mentioned in *J. A. S.* VI, 361, and now regarded by him as typical of that group. It devolves on me to furnish a description of this showy species, which may readily be distinguished from its congeners by its longer and handsomely banded tail, whereon are five dark bars, as broad as or broader than the interspaces of pale ground-tint, whereas in the other species the dark caudal bars are much narrower than the intervening spaces. The occipital crest is fully developed, measuring four inches in length. Plumage of the upper-parts deep aquiline-brown, very dark on the interscapularies, and verging upon black on the crown and occipital crest, which is slightly tipped with whitish; nuchal feathers conspicuously margined with tawny-brown, and their pale basal colour more or less shewing about the nape: under-parts whitish, more or less deeply tinged with fulvous, and marked on the breast with longitudinal broad mesial dark streaks to the feathers; the chin is blackish, continued as a median line to the breast, and two similar lateral streaks, at first very broad, proceed from the corners of the gape; belly and flanks more or less distinctly banded with brown and white, the latter narrower, and the brown darker towards the white, — the belly especially having a confusedly mottled appearance, and the under tail-coverts are similar; the lengthened tibial plumes are more distinctly banded, and the tarsal less so, becoming whitish towards the toes: tail as described, having five broad dark bands, with interspaces of a mottled light brown, becoming greyish with age; its larger upper coverts also banded brown and white, the latter narrower: primaries and secondaries dark brown, banded with blackish; their under surface and that of the tail albescent, with the bars anterior to the emargination of the primaries, and those of the outermost tail-feathers, semi-obsolete.

Length twenty-nine to above thirty-two inches, of which the tail measures thirteen to fourteen inches and a half; wing eighteen to nineteen inches; tarse four inches and a half, and in one specimen before me very densely feathered, in another much less densely. Bill two inches from point to gape, in a straight line: the talons large and powerful. Both these specimens are evidently adults, and probably male and female.

Three Indian species of this group have now been noticed; viz. *grandis*, *niveus* (aut *caligatus* ?), and *pulcher*; and there remain the following: *Sp. cristatellus* (Tem.), Jardine and Selby. *Ill. Orn.* pl. LXVI; Elliot, in *Madras Jl.*, No. XXV, 234; — *Sp. Kienerii*; *Astur Kienerii*, *Magasin de Zoologie*, Guérin, 1837, pl. 35; *Sp. albogularis*, Tickell (Nobis), *J. A. S.* XI, 456, — *pallidus*, mentioned only by Mr. Hodgson in *J. A. S.* VI, 361, which I do not know; — and *rufitinctus*, McClelland and Horsfield, *P. Z. S.* 1839, p. 153, which would scarcely seem to belong strictly to this genus.*]

6. *Limnaëtus* [*unicolor*, Vigors; *Falco limnaëtus*, Horsfield; *F. unicolor*, Temminck; *Morphnus hastatus* (?), Lesson, *Zoologie du*

* Since the above was written, the Society has received two fine specimens of a member of this genus, which, from Mr. Elliot's description, I am disposed to refer to *Sp. cristatellus*. Length about twenty-six inches, of wing from bend sixteen inches, and tail twelve inches; bill, from point to gape, an inch and three-quarters; and tarse four inches and a half anteriorly: occipital crest four inches. Colour of the upper-parts light fulvescent-brown towards the edges of the feathers, their central portion dark aquiline brown, which latter is confined to a mesial streak on the feathers of the nape; prolonged occipital crest dull black: under-parts white at base, and for the greater portion of each feather, their terminal part having a mesial dusky streak, edged with light brown; a dusky streak more or less developed from each corner of the lower mandible, and a central one on the throat well developed in one specimen, indistinctly so on the other; a brownish bar across the abdomen more or less distinct; and posterior to this the abdominal feathers and lower tail-coverts are banded with light fulvous-brown, and broadly tipped with the same, the tibial and short tarsal plumes being similarly coloured: volar feathers of the wings dusky externally, their inner webs brown with dusky bars, and the pale portion passing into white internally, anterior to the emargination of the primaries; underneath the volar plumes are white anterior to their emargination, and barred with dusky beyond it; the fore-part of the under surface of the wing being also white, mottled with dusky-brown, and the axillaries and sides marked with rufescent-brown: tail also brown above, with five dusky bands on the older specimen, the basal one indistinct, and the last or subterminal band broadest; in the other marked with six dark bands, and the rudiment of a seventh at base; underneath albescent, the dark bands partially obsolete. This species is not improbably Mr. Hodgson's *pallidus*; and can only doubtfully, I think, be referred to that figured by Messrs. Jardine and Selby.

Voyage de M. Bélanger, p. 217. A second species of this division exists in the *L. (olim Buteo) punctatus*, Jerdon, *Supplement.*]

7. *Falco* [*shaheen*, Jerdon, *Madr. Jl. No. XXIV*, 81.]

8. *Pernis* [*Ellioti*, apud Jerdon, to whom the specimens were transmitted for examination. I must confess, however, that I am by no means satisfied of the distinctions pointed out between this and the *P. cristata*, Cuvier, vel *Falco ptilorhynchus*, Tem.; specimens of both being before me so labelled by Mr. Jerdon; and one of the latter minutely agrees with the description of *P. maculosa*, Lesson, in the *Zoologie du Voyage de M. Bélanger*, except in possessing a distinct crest. Now I am unaware that any good distinction has hitherto been remarked between the *P. cristata* and *P. apivora*, further than that the European bird is never crested, both being alike variable in plumage; and I see that the latter is enumerated among Dr. Royle's birds procured at Saharunpore. In reference to the value of the character derivable from the presence of a crest, it may be remarked that Mr. Hodgson describes a variety of *Spizaëtus niveus* (his *Nisaëtus Nipalensis*, *J. A. S. V*, 229), having "a drooping Egret-like crest of two long, narrow, composed plumes"; whereas in general, and in all cases observed by me, this species has merely a very slight indication of such a crest at any age. Nevertheless, the prevalence of the crest in Indian Perns, and its invariable absence in those of Europe, are sufficiently remarkable; and probably indicate an aboriginal distinctness of species, though perhaps sufficiently allied to breed and merge together where they inhabit the same localities. M. Lesson also speaks of a *P. torquata*, *P. ruficollis*, and a *P. albogularis*, referring to his *Traité d'Ornithologie*; but if reposing only on differences of colour, I should be very slow to accept such diversities as specific].

9. *Milvinae*. Genus [*Haliastur*, Gould.] *Haliaëtus* !! *Pondicerianus*, Auct. type. [*Milvus Pondicerianus*, apud Jerdon.] Leads from Eagles to Buzzards. [It is curious to remark the difference of opinion expressed with regard to the systematic position of this well known species. Thus Mr. Hodgson writes:—"Those who have classed the *Brahminee Cheel* of India with the fishing Eagles, may be safely said to know as little of the structure, as of the habits, of that paltry *Milvine* bird," &c. (*J. A. S. VI*, 368.) And Mr. Jerdon "nearly agrees" with him in opinion; even ranging it, as we have seen, in

Milvus (*Madr. Jl.* No. XXIV, 72.) Dr. Jameson, on the other hand, avers that "no person who has ever studied this bird in its native haunts on the Hoogly or the Ganges, where it occurs in vast numbers, in company with other *Haliaëti* (!), would for a moment doubt where its proper position ought to be in the Ornithological system." (*Calc. Journ. Nat. Hist.* No. III, 318.) Mr. Gould, again, on referring a new Australian species to *Haliaëtus* (*P. Z. S.* 1837, p. 138), remarks that it is "nearly allied to *Hal. Pondicerianus*," thus doubly acknowledging the current arrangement of the latter, though he has since formed a particular section for these two species. For my own part, I have long regarded the true *Milvi* as being closely related by affinity to the *Haliaëti* or Ernes, and therefore find no difficulty in agreeing with Messrs. Hodgson and Jerdon as regards the proximity of the *Brahminee Cheel* to the Kites, while I still prefer to retain it as a subgenus of *Haliaëtus*, of which group I have already indicated three marked natural divisions, the present bird being characteristic of one of them.

10. *Astur* (?) *Dussumieri*: at least this species appears closely allied to two Australian Hawks (*approximans* and *cruentus*) recently referred to this genus by Mr. Gould, having the toes very much shorter than in restricted *Accipiter**; but it would be better perhaps to institute a separate division for this intermediate form: *Accipiter Dukhunensis*, Sykes; and] *A. scutarius*, Hodgson, [*Bengal Sporting Magazine*, for 1836, p. 180; the young: noticed also in *As. Res.* XIX, note to p. 175, together with an *A. affinis* which, from the context, I much suspect is merely the adult.† N. B. Mr. Jerdon agrees with me in referring the specimens marked *scutarius* by Mr. Hodgson to the young *A. Dussumieri*.]

11. *Buteo canescens*, Hodgson, ('*Bengal Sporting Magazine*' for 1836, p. 180.) As few naturalists, but especially foreign naturalists, have the opportunity of consulting the work referred to, I deem it proper to quote the description, and shall offer some further remarks on the species.

It is a perfectly typical Buzzard, nearly allied to the European *B.*

* Vide *P. Z. S.* 1837, p. 98.

† The *Noctua Tarayensis* there mentioned is *Athene brama*, or *N. Indica*, Franklin; and the *N. tubiger* identical with *N. Brodiei*, Burton, *P. Z. S.* 1835, p. 152.

vulgaris. "Mature female twenty-three to twenty-four inches long, by fifty-four to fifty-six inches in extent of wings, and three lbs. and three-quarters in weight:" wing from bend sixteen inches and three-quarters to eighteen inches and a quarter, and tail ten to eleven inches: point of upper mandible to gape one inch and seven-eighths; and tarse three inches and a quarter, being plumed for the upper inch and a half. The male is considerably smaller, with wings fourteen and three-quarters to sixteen inches, and tail nine inches and a half to ten and a half.

The following is Mr. Hodgson's description of the plumage: "Female: — head, neck, and body below, white; dashed here and there with beauteous buff, and streaked narrowly and lengthwise on the cap and thighs with brown: tail, whitey-brown, with four to six narrow bars towards the end: back and wing-coverts, medial brown, the larger picked out with rufous: quills immaculate externally, and the great ones darker or black-brown; all the quills blanched internally except near their tips; but the primaries, immaculate; the rest, and especially the secondaries, shewing six brown bars across the inner vanes of the plumes: legs and cere dirty-yellow; bill blue, its hook and the talons black: iris hoary.

"Male smaller and less blanched. Young greatly more coloured than the mature female; above and the thighs saturate-brown, edged with rufous; below sordidly rufescent, or luteous, with large longitudinal dashes of brownish-red, changing to herring-bones on the thighs: tail brown, with deeper cross-bands prevailing throughout, and amounting to ten in number: iris brown; legs and cere, greenish."

From a series of specimens before me, however, it is quite clear that the brightly rufous-edged specimens are adults, while the young have but little trace of this colour, which is more or less confined to the scapularies and wing-coverts, and is besides comparatively very faint and pale; and that such *are* the young is demonstrated, not only by the less acuminate form of the nuchal plumes, but from the fact that one of them was killed while beginning to moult, and shews a few of the new bright rufous-edged feathers among its scapularies, which contrast strongly with the dull hair-brown colour of the rest of the upper-parts. A particularly fine female, received from Mr. Hodgson, may be described as having the dorsal plumage and smaller wing-feathers

slightly empurpled dusky, laterally somewhat broadly margined with bright rufous, which fades considerably as the feathers become old; head dull rufescent-brown, margined paler, with a vague whitish streak over the eyes, enlarging beyond them; feathers of the nape pointed and slender, white at base, with dusky terminal thirds edged laterally with rufous; those of the sides of the neck rufescent with dusky shafts, and edged laterally with whitish or hoary; throat white, with narrow dusky shafts, and the rest of the under-parts fulvous-white, with mottled dusky-and-rufous blotches on the feathers, inclining to form a sort of gorget on the breast, and always presenting a broad dark abdominal band, more or less developed (as in *B. lagopus*): lengthened tibial plumes dusky, tipped with dark rufous, or in some specimens of the latter hue, with merely dusky shafts: tertiaries and greater wing-coverts hair-brown, the former more or less distinctly barred on their inner webs, upon a whitish ground in some; the tips of the primaries and secondaries empurpled dusky, and the outer webs of the exterior primaries greyish to near the end; underneath, the wings display a very large white patch, constituted chiefly by the inner vanes of the primaries as far as their emargination, and the fore-part of the wing is dusky, broadly edged with rufous, of which colour are also the axillaries: tail rather faint rufous, with a nearly obsolete subterminal dark bar, its basal portion, and the exterior webs of all the outer feathers, dashed with cinereous. Other specimens have merely narrow mesial streaks of rufous, with dusky shafts, to most of the feathers of the under-parts, and the abdominal band paler and chiefly rufous; tail with little or no ashy tinge, indicating that such are less advanced in age. The immature plumage is of a generally more dingy cast, with no rufous below, even on the tibial plumes; the dorsal feathers are scarcely, when at all, margined with faint rufous; and the primaries and tail are minutely mottled and numerously banded: but these also vary in the amount of development of their markings, both as regards the extent and depth of colouring.

According to Mr. Hodgson — “These birds are very common in the central and northern hilly regions of Nepál; but I never,” he remarks, “procured one from below. The species appears to be an oriental analogue of *B. vulgaris*. It adheres to the woods when the crops are up; but, after harvest, comes into the open country, and is

perpetually seen in the fields perched on a clod, and looking out for Snakes, which constitute its chief food. It also preys on Rats and Mice, and on Quails, Snipes, and Partridges; but is reduced to take the *birds* on the ground. I have seen it, however, make a splendid stoop at a Quail, which, after being flushed, chanced to alight on a bare spot, so as to be visible to the bird as he followed it with his eye on the wing and marked it settle. Teal and even Ducks are frequently slain by our bird in the same way. If he can perceive them take wing, even at half a mile's distance, he is up with them in an instant, and is sure to capture them, unless they are under cover in a moment after they touch the earth. I have carefully compared specimens of *vulgaris* and *canescens*, and cannot help thinking that the species are distinct; the breadth of the head and of the bill near it being so much more striking in the latter than in the former. Authors suppose that *Buteo vulgaris* is never found east of the Cape. Our bird is its representative."

Its representative no doubt on the Himalaya, but in Southern India there are two true Buzzards, the *B. longipes* and *B. rufiventer*, Jerdon, and in the Tenasserim provinces another, *B. pygmaeus*, Nobis.]

12. *Elanus melanopterus*: [*Petite Buse Criarde* of Sonnerat, upon which are founded *Falco vociferus*, Latham, and *F. clamosus*, Shaw.]

13. *Accipiter* [*nisosimilis*, Tickell, *J. A. S.* II, 571: *A. nisus* vel *fringillarius* of Jerdon and others. It differs from the European species in its larger size, and in having constantly a long superciliary white line; the markings of the under-parts are also somewhat different.

14. *Milvus* [*cheela*; *Falco cheela*, Gmelin: *M. govinda*, Sykes; *M. ætolius*, Lesson. *N. B.* I thought at first that the specimens sent of this bird presented certain differences from the common Indian Kite, but subsequent comparison of them with numerous examples of the latter has convinced me of their identity.]

15. *Falco peregrinus*: [*F. calidus*, Latham.]

16. *Falco* [*juggur*, Hardwicke and Gray; *F. luggur*, Jerdon] (*Lagger*, *Jhagger*, Indicè, *Maset*, fœm.)

17. *Falco tinnunculus*.

18. *Buteoninæ*. Genus *Butastur*, Hodgson. *Buteo teesa*, Auct., type. [*Circus teesa*, Franklin; *Astur Hyder*, Sykes.] It differs from the true

Buzzards in its less corpulent form, and general adaptation for more active habits: the tarsi are longer and more prominently scutellated in front, the toes also being scutellated above nearly to their base, and the talons are comparatively powerful. The markings also are somewhat peculiar, and recal to mind those of various South American *Raptors*; but still manifest a relationship to the true Buzzards, which is further conspicuously shewn by the rufous tail.

19. *Falconinæ*. Genus *Hyptiopus* (Hodgson, olim *Baza*, H. [*lophotes*; *Falco lophotes*, Temminck: *Lophotes Indicus*, Lesson; *Buteo cristatus*, Vieillot; *Colvy Falcon* of Latham; *Falco Lathamii*, J. E. Gray, and since *Lepidogenys Lathamii*. G. R. Gray; *Baza syama*, Hodgson, *J. A. S. V*, 777, which latter generic name has precedence of *Lepidogenys*, while *Lophotes* is pre-occupied in Ichthyology. Moreover, I do not consider this form to appertain to the Falcon group, but decidedly to that of the Perns and Elans.] Type.

20. *Falco chicquera*.

21. *Ierax* [*Bengalensis*: *Little Black and Orange-coloured Hawk* of Edwards, erroneously regarded as the female of *I. cœrulescens* by various authors. Vide p. 180,* *ante*.

22. *Ketupa Leschenaultii*, Lesson: *Strix Hardwickii*, Gray: *cultrungris nigripes*, Hodgson, *J. A. S. V*. 364, and mentioned in VI, 363. Identical with specimens from Southern India and the Tenasserim provinces.]

23. *Mesomorpha* (Hodgson, olim *Urrua*, H.) [*Bengalensis*; *Otus Bengalensis*, Franklin, Gould: *Bubo ? caveareus*, Hodgson, *As. Res.* XIX, 169, and since *Urrua cavearea*, H., *J. A. S. VI*, 372; altered to *Mesomorpha*, *Ibid.* X, 28, where various other prior appellations are similarly changed and classicized; *Urrua Bengalensis*, Jerdon.] Type.

24. *Meseidus* (Hodgson, olim *Bulaca*, H.) *Newarensis* [*Ulula ? Newarensis*, Hodgson, *As. Res.* XIX, 168; *Bulaca—Id.* *J. A. S. VI*, 372; *B. monticola*, Jerdon, *Supplement.*] Type.

25. *Strix flammea*: [*Str. Javanica*, apud Jerdon.]

26. Genus *Ninox*, Hodgson: type. *N.* [*scutulatus*; *Strix scutulata*, Raffles, *Lin. Trans.* XIII, pt. II, 280: *Str. hirsuta*, Tem.; *Str. lugubris*, Tickell, *J. A. S.* II, 572; *Ninox Nipalensis*, Hodgson, *Madr. Jl.* No. XIV, 23, with figure; *J. A. S. VI*, 364, where the singular paral-

lelism of proportions manifested by this species and the Hawk *Hyptiopus lophotes* is noticed in minute detail.

27. *Athene cuculoides*;] *Noctua cuculoides*, Vigors and Gould. [This bird* is found in Southern India and in the Tenasserim provinces].

28. *Scops lettia*, Hodgson [*As. Res. XIX*, 176: *Scops Lempiji* (?), Horsfield, vel *Sc. Javanicus*, Lesson, to which an Assamese specimen is referred by Dr. Horsfield. I incline to suspect that the *Sc. Sunia*, Hodgson, *Ibid.*, will prove to be merely the young, as the "Red Owl" of Wilson's 'American Ornithology' is of his "Mottled Owl", (*Sc. Asio*).

29. *Athene radiatus*; *Strix radiata*, Tickell, *J. A. S.* II, 572; *Athene erythropterus*, Gould, *P. Z. S.*, 1837, p. 136;] *Noctua perlineata*, Hodgson [mentioned in *J. A. S.* VI, 369].

30. *Lophophorus Impeyanus*.

31. *Tragopan satyrus*.

32. *Euplocomus leucomelas*.

33. [*Ithaginis* (Wagler);] *Plectrophorus*, J. E. Gray; *Ptilopachus*, Swanson;] *cruentata*.

34. *Gallophasis* (Hodgson, type,) *pucrasia*. [*Phasianus pucrasia*, Vigors and Gould. This bird certainly does not rank well in any of the divisions hitherto established among the Pheasants. Its distinctive traits consisting in the absence of any nude crimson space around the eyes, in the similarity of the sexes, the peculiar character of the plumage, and the short straight tail; but it approximates the restricted *Phasiani* more than it does any other group, and it is remarkable that the only Indian species of true Pheasant (*Ph. Wallichii* vel *Stacei*) differs from the rest in being crested, though much less heavily than the present bird, which latter is known to sportsmen by the names *Plass*, *Pucrass*, and *Koklass*.

* The Society has just been presented with a specimen from Chusan.

*Proceedings of the Asiatic Society.**(Wednesday Evening, 12th April, 1843.)*

Present.

Sir J. P. Grant, Knight,
 Sir W. H. Seton, Knight,
 Lieutenant Colonel, W. N. Forbes, C. B.
 H. Torrens, Esq.
 R. Houstoun, Esq.
 Captain A. Broome,
 N. B. E. Baillie,
 S. G. T. Heatly, Esq., and others.

The Honorable W. W. BIRD, President, in the chair.

The President opened the business of the evening by expressing his thanks to the Society for electing him as its President. He observed, that he was one of the oldest, if not the oldest, member in India; that he felt both pride and gratification in the honor conferred upon him, and would use his best exertions to uphold the credit of the Society, which had attained so much celebrity in the estimation of the scientific world. The President observed, that although he could not promise much, individually, to the Society in scientific matters, yet from his position in Society, he was satisfied that he could influence largely valuable contributions. That he had been in some measure successful in this hope, in as much as he had prevailed upon Mr. H. Torrens, the late Honorary Secretary, to continue his labors as such for the Society, aided by a stipendiary Sub-Secretary. This point was not of immaterial importance when the difficulty of procuring men of scientific attainments, and with the other qualifications requisite to fit them for the multifarious duties of Secretary to the Society was considered; and this was feelingly illustrated by the President in the case of their late illustrious Secretary, Mr. J. Prinsep, who sacrificed his life in the ardour of his scientific researches to benefit the Society. The President concluded by referring to a memorandum which had been prepared at his request, for the future conduct of the business of the Society by the Honorary Secretary, and which was read as follows:—

At a Meeting of the Committee of Papers held at Government House, on the 1st April, 1843 :—

Present

The Honorable the President.

Sir H. W. Seton, Knight,

Lieutenant Colonel W. N. Forbes, C. B.

Lieutenant A. Broome.

H. Torrens, Esq. Officiating as Secretary to the Committee.

Read the following Memorandum.

Resolved.—That its substance be generally approved, and that it be submitted to the Society at the ordinary Annual Meeting for the appointment of Officers of the Society, to be held on the 12th April.

H. TORRENS,

Officiating as Secy. to the Committee.

The Honorable the President has expressed a wish, that I should lay before him a Memorandum of the course expedient to be taken with reference to the conduct of the business of our Society by an Honorary Secretary.

The Honorable the President desires, that the office of Secretary should continue to be held as an honorary appointment. It is the wish of the Society generally.

But I have explained to him the impossibility of procuring the entire services of any honorary holder of the office, and he has acquiesced in the expediency of engaging a Sub-Secretary to conduct ordinary correspondence with current business, and to assist, under the Secretary, in the editing of the Journal lately my property, which the Society desire to take over, and make their own.

I have now to suggest the mode in which the Sub-Secretary may be remunerated, without inducing extra charge to any serious extent upon the Society. And here let me observe, that I intend submitting to the Society, with the sanction of the Honorable the President, the nomination of Mr. Henry Piddington, our Geological Curator, to the duty. His general acquaintance with the principles of science; his long experience of this country, its usages, and its people; his literary qualifications; his habits of business; and last not least, his well-known zeal for science, his mental powers and his energetic use of them; render him more eligible for the very miscellaneous and peculiar duties which he could be called upon to perform as Sub-Secretary than any person with whom I am acquainted in Calcutta or in India. I have had good reason to know how well he could perform those duties by my experience of the manner in which he has already assisted me in my attempts to perform the work of Secretary.

Having thus premised, I proceed to note my scheme.

1. That there be an Honorary Secretary to the Society, charged either alone, or as associated with other Honorary Secretaries, with the special duty of conducting the department of Oriental Literature.

2. That he be answerable to the Society for the proper disposition of their funds, under the immediate instructions of the President.

3. That he be further answerable to the Society, for the due and proper conduct of

their correspondence, foreign and internal, and that he have the supervision of the publication of the Journal.

4. That he be assisted by a Sub-Secretary, whose duty will be to act under the Secretary for the purposes noted in No. 3, as also for the general charge of the premises, and property of the Society; to check all petty charges and disbursements in the departments of Curator and the Museum, and the Curator of the Museum Economic Geology, before submitting them to the Secretary, and to assist in editing the Journal of the Society under that officer.

5. That he be paid for these services, 200 rupees a month.

And here is the supposed difficulty, the procuring of funds for this salary.

Now the interest of our funded monies—Rupees 13,000, Csoma de Koros' legacy (Rs. 4000) not included; gives about 60 (sixty) rupees a month.

The appointment of a Sub-Secretary will render superfluous that of the Museum Clerk employed under the Librarian on 60 (sixty) rupees a month. The demand from Government of the payment of the contingent charges of the Museum Economic Geology, averaging about 40 (forty) rupees a month will save the Society this sum,* and render it so much available for general purposes.

Thus we should have:—

Interest, ..	..	..	..	60	} Rs. per Mensem.
Salary saved, ..	..	..	..	60	
Charges saved, ..	..	..	..	40	
Total Rs. ..	..	..	..	160	

The residue necessary for the complement of 200 rupees, may be easily spared out of the sum (about 4,000 rupees,) which used to be spent annually by the Society in the purchase of the Journal for their members, and I can safely say, that the expense will be more than trebly covered by the saving which close supervision and better management must induce in the cost and charges of editing the Journal as the property of the Society.

I would have suggested the re-organization of our Accountant's Office and Assignment to the Sub-Secretary of the duties belonging to it, but I cannot recommend that scheme.

The Sub-Secretary should be relieved from all financial responsibility, and be left to devote himself to the active duties of his peculiar position. Mr. PIDDINGTON, with his other work, will have, as I see he has now, more than ample occupation for all his time in the Sub-Secretariat, the duties of which he is indeed experimentally performing.

Sub-Secretary's Salary.

Interest, ..	..	..	..	60
Salary saved, ..	..	..	..	60
Costs ditto, ..	..	..	..	40
Allowed from Journal, ..	..	..	..	40
Total Rs. ..	..	..	..	200

As the contingent charges of the Museum Economic Geology, may be occasionally under 40 rupees, it might be well to rate our new outlay at 50 rupees a month, for

* I never sent in this bill to Government, keeping the demand until the Museum Rooms for the institution had been built at the Society's cost and charges, when it might justly be made.

which the Society will secure efficiency of a sterling character in the important duties of their Secretariat.

Should the Society, as noted by the Honorable the President, think my services as Honorary Secretary of any value, I willingly offer those, though save as respects some portion of Oriental Literature, they are very worthless. H. TORRENS.

March 24, 1843.

N. B.—Serious and severe illness has delayed the preparation of this paper.

This memorandum having been again read to the meeting was unanimously passed and approved, and Mr. H. Torrens was accordingly appointed Honorary Secretary, and Mr. H. Piddington Sub-Secretary to the Society, under his superintendence, upon a salary of Rs. 200 per month.

Sir L. Peel, Chief Justice, and W. Seton Karr, Esq., proposed at the former meeting were ballotted for, and unanimously elected as members of the Society.

Ordered.—That the usual communication of their election be made to Sir L. Peel and Mr. Karr, and that they be furnished with the rules of the Society for their guidance. The following gentlemen were proposed as Members of the Society:—

Lieut. R. Strachey, B. E. proposed by Lieut. Baird Smith, B. E., seconded by Mr. Piddington.

Capt. Goodwyn, B. E. proposed by Lieut. A. Broome, B. H. A. and seconded by Lieut. Col. Forbes.

The Honorable H. T. Prinsep was also proposed as a Honorary Member by the Honorable the President, seconded by Sir H. Seton.

Library.

The following Books were presented:—

Books received for the Meeting of the Asiatic Society, on the 12th April 1843.

The Calcutta Christian Observer, April, 1843. Presented by the Editor.

The Oriental Christian Spectator. Bombay, February and March 1843. Presented by the Editor.

The Calcutta Literary Gleaner, March and April 1843. Presented by the Editor.

Proceedings of the Academy of Natural Sciences of Philadelphia, 1841-42. vol. 1. Nos. 1 to 16, from the Academy.

List of the Members and Correspondents of the Academy of Natural Science of Philadelphia, 1841, from the Academy.

Second Bulletin of the Proceedings of the National Institution for the promotion of Science. Washington 1842. Presented by Dr. Harlan.

Redfield on Whirlwind Storms, with replies to the Objections and Strictures of Dr. Hare. Presented by the Author.

Redfield's Reply to Dr. Hare's further objections relating to Whirlwind Storms. Presented by the Author.

- State of New York, in Assembly, January 1840. No. 50, and February 1841, No. 150. Presented by Mr. Morton.
- Bernier's Travels, translated from the French by J. Stuart. Calcutta, 1826. Presented by Dr. Roer.
- Nicollet's Essay on Meteorological Observations. Presented by Dr. Morton.
- Morton's Description of some new species of organic remains of the Cretaceous Group of the United States. Presented by the Author.
- Morton's Inquiry into the distinctive characteristics of the Aboriginal race of America. Presented by the Author.
- Catalogue of Skulls of Man and the inferior Animals, in the collection of S. G. Morton. Presented by Dr. Morton.
- Morton's Memoir of William Maclure, Esq. Presented by the Author.
- Morton's Remarks on the so-called Pigmy race of the Valley of the Mississippi. Presented by the Author.
- Morton's Some Remarks on the ancient Peruvians. Presented by the Author.
- Audubon and Bachman's description of new species of Quadrupeds inhabiting North America. Presented by Mr. Morton.
- Wood's Memoir of the Life and Character of the late J. Parrish. Presented by Dr. Morton.
- Roger's Third Annual Report on the Geological Survey of the State of Pennsylvania. Presented by Dr. Morton.
- Morton's Crania Americana (from the American Journal of the Science and Arts, No. 2. vol. 38. Presented by Dr. Morton.
- Say's Descriptions of some new Terrestrial and Fluvial Shells of North America. Presented by Dr. Morton.
- Pinnock and Moore's Report of Experiments on the Action of the Heart. Presented by Dr. Morton.
- Report on the strength of materials for Steam Boilers. Presented by Dr. Morton.
- Wight's *Icones Plantarum Indiæ Orientalis*, vol. ii. part iv, from the Government of India.
- Morton's Crania Americana, or comparative view of the Skulls of various Aboriginal Nations of North and South America. Philadelphia, 1839. Presented by the Author.
- Herapath's Railway and Commercial Journal, January 7th, 1843, vol. v. No. 178.

Read the following papers; viz. Letter No. 502, dated 29th March, 1843, from Mr. Secretary Thomason, transmitting a report by Lieut. J. D. Cunningham, of Engineers, on the province of Kunawar and the adjacent Bhotec districts, for publication in the Society's Journal, should it be deemed fit to do so.

Letter from Lieut. R. Baird Smith, of Engineers, of 25th March, 1843, forwarding for publication in the Journal the first part of a Memoir on Indian Earthquakes.

Letter from Mr. Officiating Secretary Halliday, of 3rd March, 1843, forwarding for presentation to the Society, a volume of *Icones Plantarum*

India Orientalis, or Figures of Indian Plants, by Surgeon R. Wight, of the Madras Establishment.

Letter from Sam. George Morton, Esq. of Philadelphia, of 4th Aug. 1842, forwarding for presentation to the Society, a copy of his "Crania Americana," and requesting to be furnished with skulls of Hindoos and other oriental nations, to aid him in the pursuit of his comparative investigations, which now embrace all the races of men.

Letter from B. H. Hodgson, Esq. dated 1st instant, communicating that Mr. Howard is about to come forth in the present month with the first division of the Zoology of Nipal (Mammalia), and that he expects half the price of each division of the work, or Rs. 25, to be paid in advance.

Read the following report from the Officiating Secretary:—

1. The Officiating Secretary reports, that having, as was desired, made enquiries as to the expence of raising the whole roof over the stair-case instead of a skylight, he is informed that this would cost at least 800 Rupees: Mr. Bolst, our architect, thinks it very dangerous to undertake, with reference to the state of the architrave beams round three sides of the square and that of the screen wall on the fourth. By taking away the shelves on brackets which support the model of the Taj, and that of the Lama temple, and by opening the doors of the new rooms, bird-room and fossil room below, it has been found that a sufficient light for the objects intended to be placed below the stairs may be obtained. It is therefore thought by Mr. Torrens and himself, that for the present the skylight may be dispensed with.

2. It was reported at the January meeting, that Major Troyer had advised the Secretary that the French Government had renewed the allowance of 1500 francs, (650 Rs.) for copying the Veds. Upon a reference to the French Government at Chandernagore, the authorisation which this letter contains has been received, and when the money is brought to account, the Society will debit the French Government with the balance of 233 : 7 : 9 Rs., due from it to the late Mr. J. Prinsep's estate, and which was provisionally paid by the Society. See Proceedings for June 1839.

The arrangements for continuing the copying have been duly made, and the work is in progress.

It would be highly advisable that the Society should determine as to what individuals and Societies the Journal should be sent. The American Societies and some individuals in that country are most attentive in sending us their publications, as also some in France. As will be noted by the accompanying letters, we are much arrear with our American friends. I have obtained a list of our present distributions, which is annexed, and I may mention the Academie Royale de Bordeaux as a public body regularly forwarding to us its transactions, but, as it would appear, not receiving our Journal.

List of the Journal of the Asiatic Society distributed gratis on behalf of the Society, by Messrs. Allen and Co. of London.

Professor Wilson, .....	.....	.....	1
Asiatic Journal, .....	.....	.....	1
Royal Society, .....	.....	.....	1
Royal Asiatic Society, ....	.....	.....	1
Edinburgh Philosophical Journal, .....	.....	.....	1
Royal Institution, .....	.....	.....	1
Philosophical Magazine, .....	.....	.....	1
Athenæum, .....	.....	.....	1
Professor Heyne, .....	.....	.....	1
Baron Von Hammer Purgstall, .....	.....	.....	1
University of Bonn, .....	.....	.....	1
Royal Society of Edinburgh, .....	.....	.....	1
Spectator, .....	.....	.....	1
Professor Schlegel, .....	.....	.....	1
			<hr/>
			14
Dispatched direct from Calcutta, to Major Troyer, Paris,.....			10
Sir H. T. De la Beche, .....	.....	.....	1
			<hr/>
			Total..... 25 Copies.

Read the following letters of 12th instant, and lists from Dr. Roer Librarian.

To H. Piddington, Esq. Acting Secretary, Asiatic Society.

SIR,—In continuation of my arrangement of the Antiquities of our Museum, I have the honour of forwarding three lists to you; viz. of the armour, of the musical instruments, and of the models of implements, tools, specimens of manufacture of the natives of India and other Asiatic nations. The arrangement of those articles has now been completed, and it is satisfactory to me to inform you, that the names of the donors and the locations of the greater part of them have been ascertained and duly noted.

I have the honour, to be, Sir,

Your obedient servant,

12th April, 1843.

G. ROER.

Models of Implements, Tools, Machines, &c.

1. A Hindustani plough, called Hal. Donor Miss Tytler. As. Res. Vol. xv. App. xxxv.
2. A Hindustani drill plough. Donor ditto ditto.
3. Model of a native plough. Donor G. T. Lushington, Esq.
4. A Javanese plough. Donor Capt. T. Fiddes. As. Res. Vol. xiii. App. xvii.
5. Plough used by the Parbuttiachs. Donor Dr. A. Campbell.
6. Instruments for digging and clearing lands of weeds. Donor Miss Tytler, As. Res. Vol. xv. App. xxv.
7. A Hindustani spade, called Phaura. Donor ditto ditto.
8. A spade, called Koo by the Newars, and Kodalli by the Parbuttiachs. Donor Dr. A. Campbell.

9. Three Hindustani sickles or Hansuas. Donor Miss Tytler. As. Res. Vol. xv. App. xxv.
10. Henga, an instrument for pressing the seeds into the ground, and breaking clods, like the English roller. Donor Miss Tytler, As. Res. Vol. xv.
11. An instrument, called Kurmaghan by the Newars, used for breaking the clods and pressing the soil. Donor Dr. A. Campbell.
12. Roochi-mughan, used to cover sown wheat and gogha, or Upland rice. Donor ditto ditto.
13. Chassa-mughan, used to smooth the flooded beds, in which the seeds and taki are sown, and also to prepare the soil for sowing vegetables, pepper, (red) ginger, &c. Donor ditto ditto.
14. Poo-retcha, used for weeding the dry rice. Donor ditto ditto.
15. Chong-kuki, used for weeding the dry rice. Donor ditto ditto.
16. Rúé, used for spreading grain and collecting it in heaps after its removal from the straw. Donor ditto ditto.
17. Rúti, used for making chawl, (rice) from dhan and for pounding bricks. Donor ditto ditto.
18. Chon-rumna. Donor ditto ditto.
19. A dhunki, or chalni, used for separating grain from the husk. Donor Miss Tytler. As. Res. Vol. xv.
20. Another, ditto ditto.
21. Ukhli-músel, or pestle and mortar for separating grain from the husk. Donor ditto ditto.
22. Dhenkí, used for ditto ditto. Donor ditto ditto.
23. Ooghan-okua, used by the Parbuttiachs for ditto ditto. Donor Dr. A. Campbell.
24. Sup, used for winnowing corn. Donor Miss Tytler. As. Res. xv.
25. A model, shewing the manner in which the oxen tread out the corn. Donor ditto ditto.
26. A mill for grinding corn, called by the natives janta-chakhi. Donor ditto ditto.
27. Another ditto ditto.
28. Model of a grinding stone. Donor ditto ditto.
29. A kolhu, or Hindustani oil mill. Donor ditto ditto.
30. An oil press, called Chikon-sa. Donor Dr. A. Campbell.
31. Model of the native mill for grinding mustard-seed. Donor G. T. Lushington, Esq. As. Journal, iv. p. 56.
32. A sugarcane-mill or press, called Tura by the Newars, and Rula by the Parbuttiachs. Donor Dr. A. Campbell.
33. A water-mill, called Pan-Chaki on the Northern Doab and Western hills, and Kan by the Newars. Donor ditto ditto.
34. Model of a still for distilling spirits, made of the original materials. Donor Miss Tytler. As. Res. Vol. xv.
35. Model of a still for distilling rose water, made of the original materials. Donor ditto ditto.
36. Múli, a machine for raising water from the well. Donor ditto ditto.
37. Mut, used in Hindustan for raising water. Donor ditto ditto.
38. A machine for raising water. Donor ditto ditto.
39. A bambú basket with which the natives of India water the rice fields. Donor ditto ditto.
40. Koring, a Persian wheel for watering land from a tank or ditch. Donor ditto ditto.
41. Cherkhi, used for separating the seeds from the cotton wool. Donor ditto ditto.
42. A ditto ditto.
43. Dhunki, an instrument in two pieces for beating cotton after the seeds have been separated. Donor ditto ditto.
44. Kaman, a bow with which the spinner beats cotton. Donor ditto ditto.
45. Cherkha, spinning wheel of India. Donor ditto ditto.
46. Model of the native spinning wheel. Donor G. T. Lushington, Esq. As. Journ. vol iv. p. 56.
47. A Weaver's Loom, with a weaver, holding a shuttle in his hand. Donor Miss Tytler. As. Res. vol. xv.
48. Model of an instrument, shewing the first stage of preparation for the loom. Donor ditto. ditto.

49. Model of an instrument, shewing the second stage.
50. Reel, in which the skeins of thread are put. Donor ditto ditto.
51. Pareta, or reel of India. Donor ditto ditto.
52. Model of a Loom for weaving bobbin and tape.
53. Ditto ditto, for weaving Hindustani woollen carpets.
54. Ditto ditto, for cotton carpets, called satrinjé.
55. Another ditto ditto.
56. Ditto, for preparing chicks.
57. Ditto ditto, jhalar.
58. Part of the Floor of a House, where golden thread is prepared.
59. An Apparatus for drawing golden thread.
60. A ditto silver thread.
61. A Loom for weaving coarse canvas. Donor ditto ditto.
62. A ditto ditto.
63. A ditto for weaving blankets. Donor ditto ditto.
64. Model to make embroidered cloth. Donor ditto ditto.
65. A Machine for preparing single threads from the leaves of the sirkhi grass. Donor ditto ditto.
66. A bundle of Hemp Cords. Donor ditto ditto.
67. Daéra, instrument for spinning hemp. Donor ditto ditto.
- 68-69. Two Instruments to twist thread. Donor ditto ditto.
70. An Apparatus, used in Hindustan for making butter. Donor ditto ditto.
71. Model of a Saw, used by the natives of Hindustan. Donor ditto ditto.
72. Ditto of an Instrument for drawing circles on the ground with carpenter's hatchets and saw.
Donor ditto ditto.
- 73-92. A variety of Tools and Instruments.
93. A small Harpoon. Donor R. Home, Esq. As. Res. xii.
- 94-97. Various Tools.
98. A Chak or Potter's Wheel. Donor Miss Tytler.
99. Model of a Potter's Instrument for preparing earthen pots. Donor ditto ditto.
100. Model of a Blacksmith's Forge and Bellows, with two anvils. Donor ditto ditto.
101. Model of a steel-yard. Donor ditto ditto.
102. Model of the steel-yard, used by the natives for weighing, (called túlah.) Donor Raja Kali Kishen Bahadur.
103. Model of an Apparatus, for catching birds. Donor Miss Tytler.
104. Ditto of a Frame, for making tallow candles. Donor ditto ditto.
105. Ditto of an Apparatus, for making paper. Donor ditto ditto.
- 106-110. Five wooden Stereotypes from Tibet.
- 111-133. Twenty-three Models of Kitchen Utensils of Hindustan.
134. A native cart. Donor Miss Tytler, As. Res. Vol. xv.
135. A bullock cart, for conveying gram. Donor G. T. Lushington, Esq.
136. A Girth, for a bullock.
137. Ruth, native carriage drawn by bullocks. Donor G. T. Lushington, Esq.
138. Ekha-garee, carriage drawn by one horse. Donor Miss Tytler.
139. Ruth, drawn by two horses. Donor G. T. Lushington, Esq.
140. Sagur-garee. Ditto ditto.
141. A Carriage, for females. Donor Miss Tytler.

*B. Specimens of Manufacture.**a. OF CLOTH.*

142. Specimen of Erria cloth (once washed.) Donor Dr. R. Tytler.
143. Specimens of Erria cloth. Donor ditto ditto.

144. Toos, a sort of coarse cloth, (unwashed.) Donor ditto ditto
 145. Toos, white cloth (20-22 Rs. per Than of 27 by 1 yard.) Donor ditto ditto.
 146. Mulida, dark-red cloth. (5 Rs. per Than of $7\frac{1}{2}$ yards, broad 1 yard.) Donor ditto ditto,
 147. Mulida, blue, (5 Rs. a Than.) Donor ditto ditto.
 148. Nimbee, blue, (3 Rs. 8 As. per Than of 8 yards.) Donor ditto ditto.
 149. Penchan, white cloth, (30-34 Rs. per Than. of 27 by 1 yard.) Donor ditto ditto.
 150. Punkhee, white, (2 Rs. per Than of 9 by 1 and 2 yards.) Donor ditto ditto.
 151. Nimboo, green, (3 Rs. 8 As. per Than of 8 yards.) Donor ditto ditto.
 152. Specimens of Mugah cloth, (unwashed.) Donor ditto ditto.
 153. Cloth of the floss of the Mugah. Donor ditto ditto.
 154. A piece of coarse Cotton (unwashed.)
 155. A piece of striped Cotton. Donor H. Torrens, Esq.
 156. A piece of white Cotton.
 157. A coarse kind of red Cloth.
 158. A Blanket of cotton and cotton thread.
 159. A woollen Blanket, (striped.)
 160. A Scarf.
 161. A ditto ditto.
 162. A piece of Cloth, made of the bark of the mulberry tree of the Friendly Islands. Donor Capt. P. Dillon. As. Res. Vol. xvi. App. v.
 163-70. Eight ditto ditto.
 171. Specimens of Cloth, made by the Javanese from the bark of the Upas tree. Donor Dr. R. Tytler.
 172. A Coat, made of the bark of a tree, (Java.)
 173. A Chandua, (cotton cover against the dew.)
 174-198. Specimens of cotton and wool, manufactured at Nepaul, Tibet and Botan. Donor Dr. A. Campbell. As. Journ. vol. v. p. 127.
 199. English Shawl from Herat.
 200. Specimens of Tibetan sheep wool and cloth.
 201. Ditto ditto of goats' wool.
 202. Ditto ditto of Bactrian camel.

b. Of other Articles.

I. FROM INDIA.

203. A Box to keep chunam, (lime.)
 204. A Box to keep shindúr, (Vermillion.)
 205-206. Two small wooden Boxes from Java.
 207. Golap-pass, a silver vessel for sprinkling rose-water.
 209-211. Models of a complete set of the hooka. Donor Miss Tytler.
 212. A square Lantern of tin.
 213. Silver ornament of a horse.
 214. Bridles and Ornaments of a horse, (in a state of great decay.)
 215-16. Two marble Cows with calves, from Joypore.
 217. Ditto ditto Elephant, mounted.

218. Ditto ditto Horse, mounted.
 219-20. Two wooden Horses, mounted.
 221-222. Two wooden Elephants.

2. FROM AVA.

223. A set of playing Cards. Donor Dr. Tytler. *As. Res.* Vol. xvi, App. xiii.
 224. Dominos. Donor R. Home, Esq. *As. Res.* Vol. xii, App. xxx.
 225-27. Three metal Boxes.
 228-29. Two more of a different shape.
 230-60. Thirty-one specimens of Burmese Lacquered or Japanned-ware from Ava.
 Donor Major Burney. *As. Journ.* Vol. i, p. 158.
 261. Instrument for fixing the varnish.
 262. Paper, made of the remains of vegetable matter, remarkable for its hygrometrical quality. Donor Mr. Swinton.
 263. Paper made in India.
 264-65. Two pieces of Leather, dressed with oil and tallow. Donor Mr. Swinton. 1833.

3. FROM NEPAL.

- 266 Ornamented Chata. Donor Dr. L. Burlini.
 267. Ditto ditto. Donor Miss Tytler. *As. Res.* Vol. xv.
 268-69. Two Steels for striking fire. Donor J. Brown, Esq. *As. Res.* Vol. xii, App. xxi.
 270. A Bowl of a Pipe, made of Arracan clay. Donor Dr. R. Tytler. *As. Journ.* Vol. v. May 1836.
 271-72. Two Inkstands. Donor Dr. A. Campbell.
 273-274. Two Inkstands with pencase, of peculiar construction.
 275. A ditto ditto of copper.

4. FROM TIBET.

- 276-79. Four pairs of Spectacles. Presented by the Government of India. *As. Res.* vol. xvii. p. 622.
 280. A pair of Eye-covers. Donor ditto ditto.
 281. An Eye-cover, (Tibetan?)
 282. A pair of ear-covers Donor Government of India.
 283. A ditto ditto, (Tibetan?)
 284. A Fan. Donor ditto ditto.
 285. A ditto in a case. Donor ditto ditto.
 286. A silk Fan Case, (Tibetan?)
 287. A silk Purse. Donor ditto ditto.
 288. A silk Bag. Donor ditto ditto.
 289. A ditto ditto, (Tibetan?)
 290. A silk Cover, (Tibetan?)
 291. A Brush with napkin. Donor ditto ditto.
 292. A Watch Case. Donor ditto ditto.
 293. Inkstand and Case. Donor ditto ditto.
 294. Knife and Sticks. Donor ditto ditto.
 295. Ditto ditto.

296. A wooden Cup. Donor ditto ditto.
 297. A pair of Mogul Boots. Donor ditto ditto.
 298. A ditto Shoes. Donor ditto ditto.
 299. A Lantern in a tin case. Donor ditto ditto.
 300. A ditto in a red box. Donor ditto ditto.
 301. Cover for a snuff box. Donor ditto ditto.
 302-304. Three Prayer Cylinders.
 305. A Cashmere Box. Donor Mr. Moorcroft. 1833.

5. FROM CHINA.

305. Four pair of Tea Cups and Saucers, from Ningpo. Donor Lieut. J. Brockman, Asiatic Journal, Vol. xi. p. 582.
 306. Two ditto of Sugar-pots with plates. Donor ditto ditto.
 307. Two plain Cups with covers. Donor ditto ditto.
 308. A metallic Cup and Saucer. Donor ditto ditto.
 309. Four porcelain Spoons. Donor ditto ditto.
 310. A Tea-pot. Donor ditto ditto.
 311. A pair of Wall Flower Vases. Donor ditto ditto.
 312. Lock and Key. Donor ditto ditto.
 313. A pair of Scales on the principle of the Steel-yard in a wooden box. Donor ditto ditto.
 314. An Opium Box of tortoise-shell. Donor ditto ditto.
 315. A brass Button of a Mandarin's cap. Donor ditto ditto.
 316. A Coat made of Fur. Donor ditto ditto.
 317. A Figure made of soap-stone. Donor ditto ditto.
 318. A Mandarin's Cap. Donor Mr. F. D'Cruze.
 319. A silk Scarf. Asiatic Journal, Vol. v. p. 383.
 320. Soles of Chinese Shoes.
 321. Chinese Chatta-hat of palm leaves. Donor Gen. Hardwicke. As. Res. Vol. xv. App. xxxiii.
 322-26. Chinese Hats of sizes.
 327. Model of a China Lady's Foot. Donor W. K. Ord, Esq. As. Res. Vol. xvi. App. xxi.
 328. An Oil-burner.
 329. A Pipe.
 330-31. Two ditto. Donor R. Home, Esq. As. Res. Vol. xii. App. xxiv.
 332-36. Five Pipes from Chinese Tartary.
 337-38. Two Compasses. Donor R. Home, Esq. As. Res. Vol. xii. App. xxiv.
 339. A set of China Chopsticks. Donor ditto ditto.
 340. A ditto ditto.

Ornaments, Ornamental Implements, Dresses, &c.

- 341-46. Ornaments, worn by the Ooriah women, consisting of 4 Bracelets, a Ring and an Ear-ring. Donor Baboo Ramcomul Sen, As. Journ. Vol. v. p. 559.

- 347-48. Two brass Sticks for putting black powder into the eyes, used by the Hindus.
349. A brass Stick to colour the forehead.
350. An Ornament for the arm, worn by the natives of India.
- 351-52. Two brass Bracelets.
353. Lac Bracelets, used by the women of India. Donor Miss Tytler, *As. Res.* Vol. xiv. App. iii.
- 354-56. Three Armlets, worn by Shuniasis.
- 357-58. Two pair brass Bracelets, worn by Shuniasis, (from Java.)
359. Necklace of Shells. Donor Col. Morrison. 6th Nov. 1839.
360. Another smaller one.
361. Necklace of Seeds and Shells from Gurangupune. Donor J. Palmer, Esq., *As. Res.* Vol. xiv. Appendix xxix.
- 362-63. Two more of Shells.
364. A Necklace made of tulushi wood, and worn by the worshippers of Vishnu.
- 365-66. Two Necklaces of a kind of nut, worn by the worshippers of ditto.
367. Rudracsha Mala. Donor H. H. Wilson, Esq. *As. Res.* Vol. xii. App. xxiii.
368. A Necklace of Stone, worn by Fakeers.
369. A ditto ditto.
370. A ditto ditto.
371. A Hindu Beggar's Dress and Bag.
372. A ditto ditto Begging Dish made of Human Skull.

*Models of Implements, Specimens of Manufacture, Utensils, &c. from the Eastern Islands.**

373. An Instrument to strike fire, from King George's Sound. Donor J. H. Stocqueler, Esq.
374. A Mallet from ditto ditto. Donor ditto ditto.
- 375-77. Three Wooden Dishes from the South Seas, Manicola, Tucopia and Majeer. Donor Capt. P. Dillon.
378. Fishing Line, &c. from the Eastern Islands. Donor R. Home. Esq. *As. Res.* Vol. xii. Appendix xxiv.
379. Sling from ditto ditto. Donor R. Home, Esq.
380. Ditto ditto.
381. A carved Ornament of a boat.
- 382-87. Pillows from the Friendly Islands. Donor Capt. P. Dillon. *As. Res.* Vol. xvi.
388. A Box from the Eastern Islands.
389. A Work Box from ditto ditto.
390. A Box from New Zealand. Donor Capt. P. Dillon, *As. Res.* Vol. xvi. App. ix.
391. A Work Box from ditto ditto. Donor ditto ditto.
- 392-93. Two carved Musical Instruments from the Eastern Islands.
394. Bracelets of Shells from ditto ditto.

* See also 162 to 172.

395. Ditto of Boar Tusks. Donor R. Home, Esq. As. Res. Vol. xii. p. 23.
 396. Ornaments from—
 397-402. Mangeer Fans.
 403-4. Two mother of pearl shell Ornaments of New Zealand Chiefs. Donor Gen. Hardwicke. As. Res. Vol. xii.
 405. Cassava Bread from Dampier's Straits. Donor J. Bell, Esq. As. Journ. Vol. v. p. 517.

Curiosities and Sundry Articles.

406. A Lama's Thigh-bone (in the form of a flute.)
 407. Specimens of mud casts of the Lingam, which are worshipped by the Hindus, while performing their ablutions.
 408. Model of a Granary.
 409. Fragment of the tusk of an Elephant with a ball.
 410. A piece of Planking and Copper Sheathing from the bottom of the Ship *Adele*, pierced by the horn of Narwhal on her voyage from Penang to Akyab, on the 24th January, 1833.
 411. Copper from the bottom of the Ship *Guide*, struck by lightning while in dock. Donor J. M. Seppings, Esq.
 412. Cover of a box.
 413. Specimens of Horse Shoes.
 414. Specimens of Malacca Tin, presented by Lieut. Newbold. 1835.
 415. Malayan Head-dresses, presented by Gen. Hardwicke. As. Res. Vol. xii.
 416. Two Malayan Pipes.

Musical Instruments.

NEPALESE.

- 1-2-3. Horns, called in Hindee Bhorang. Donor M. S. Bramley, Esq.
 4. Bass Horn, of copper, called Singha. Donor ditto ditto.
 5-6-7. Hautboys, or Sanáis. Donor ditto ditto.
 8. Trumpet, or Phongga, Newari. Donor Dr. A. Campbell.
 9-10. Flageolet, or Mohalli. Donor ditto ditto.
 11-12. Horns, or Singha, Nepal. Donor ditto ditto.
 13. Nug Pheni, or Turi, Parbattiahs. Donor ditto ditto.
 14. Bansuli, Flute or Fife. Donor ditto ditto.
 15. Beli, or Krisna-beli, Newari flute. Donor ditto ditto.

COLE COUNTRY.

16. Tampoorah, used by the hill people near Hazaribagh. Donor Lieut. J. Audry.
 17. Ektarraw ditto ditto Donor H. H. Wilson, Esq. Donor Baboo Ramcomul Sen.

BENGALESE.

18. Khartala. Donor H. H. Wilson, Esq.
 19. Gojee. Donor ditto ditto.

20. Doobdoobi.
21. Been Setara.
22. Setara.
23. Serang.
24. Sarinda.
25. Bank.
26. Bhorang.
27. Bansuli.
28. A pair of Kartala.
29. A ditto small ditto.
30. A pair of Mandira.
31. Jhanj.
32. Kansara.
- 33-34. Sanayis.
35. Dhol.
36. Dholaka.
37. Jaraghayi.
38. Tasa.
39. Dagara.
40. Kada.
41. Ram-a-Kada.
42. Dhamsha.
43. Tikaras.
44. Jayadhak.
45. Mridanga.
46. Madala.
47. Pakwaz.
48. A pair of Tabla.
49. Dampa.
50. Dara.
51. Khanjaris.
- 52-53-54. Sanayis.

CHINESE.

55. Flute. Donor, Dr. R. Tytler.

BURMESE.

- 56-57. Fiddles.
58. Harp.

UNIDENTIFIED.

59. A double Flute or Fife.
60. A Fiddle.
61. A Bamboo Flute.
- 62-63. Bamboo Flutes.

Armour and Weapons.

a. NEPALESE.

- 1 to 4. Swords. Donor, B. H. Hodgson, Esq.
 5 to 12. Swords.
 13-14. Sword, Kukri and Khonta. Donor Genl. Bhima Sinha, Journ. As. Soc.
 Vol. v. p. 56.
 15. A Dagger. Donor ditto ditto.
 16-17. Daggers.

b. ORISSA.

18. Battle Axe. Donor J. G. Balmain, Esq.
 19. Six Arrows from the hills of Kuttuck, used by the Paiks. Donor ditto ditto.

c. NAGA.

- 20-21. Spears. Donor Mr. Milne.
 22-23. Swords. Donor ditto ditto.
 24-25. Battle Axes. Donor ditto ditto.
 26-27. Swords.
 28. War Cap, worn by the chiefs. Donor Mr. Milne.

d. HINDUSTANI.

29. Sword dug up from six feet under the bed of the Jumna river. Donor Lieut. Burt.
 30 to 35-36. Cut-an-thrust sword. Donor H. Torrens, Esq. As. Journ. May 1842.
 37 to 41. Copper Weapons found in the earth near Futtehgerh. Donor T. Williams,
 Esq.
 42. Copper Dagger.
 43 to 46. Daggers.
 47. Copper Head of a Spear. Donor Capt. Presgrave.
 48 to 51. Blades of Spears.
 52 to 65. Spears, (silver mounted.)
 66-67-68. Spears, (brass mounted.)
 69 to 74. Spears, (plain ones.)
 75. Matchlock. Donor W. L. Gibbon, Esq.
 76. A single barrel Gun, with double lock. Donor Lieut. Anderson.
 77 to 82. Battle Axes.
 83-84-85. Chain Shirts.

- 86-87. Chain Collars.
 88 to 91. Iron Breast Plates.
 92 to 95. Ditto Plates for the back.
 96. Ditto Helmet.
 97. Ditto ditto, covered with iron net.
 98. A Cap.
 99-100. Two Gauntlets.

MERGUI.

- 101-102. Shields used by the warriors.
 103. Helmet.
 104. Brass Collar.
 105. A pair rattan Cases, worn on the legs, under the slight bamboo rings, to give the calf a large appearance.

ASSAM.

106. Sword. Donor Dr. L. Burlini.
 107. Bhotian Standard, carried before the King in war. Donor Capt. Bogle.

CHOTA NAGPORE.

- 108-109. Iron Shields.
 110. A brass Shield. Donor G. W. Hamilton, Esq.
 111. Chok-krow.

BURMESE.

112. Sword, with silver mounted scabbard and handle.
 113. War-hat, worn by the Singphos. Donor Col. A. Burney.

MALAYAN.

114. An ornamented Spear. Donor Capt. M. Kittoe.
 115. Lahore Matchlock, purchased from one of Runjeet Singhs' Jhounhurras. Donor H. Torrens, Esq. As. J. May 1842.
 116 to 17. Two Peshawer fire-locks, mounted, one after the Native and one after the English fashion; the locks made by Cashmeree Gunsmiths of Ludiana, to imitate Towerlocks. Donor H. Torrens, Esq. May 1843.
 118. A Gun. Donor ditto ditto.
 119. A Knife used by the Tribes about the Khyber Pass, or Afreddees, Momunds, &c. Donor ditto ditto.
 120. Pirate's Dart Tube. Donor Lieut. C. Mackenzie. Journ. As. Soc. Vol. v. p. 517
 121. Ditto ditto, with a blade answering for spear.

- 122 to 124. Swords.
 125 to 127. Krises.
 128. Malay Pirate's Quiver, containing poisoned darts. Donor Lieut. Mackenzie.
 129. Ditto ditto, containing poisoned darts and small arrows.
 130. Spear with double blades.
 131-132. Spears, (brass mounted.)
 133. Spear.
 134 to 139. Spears.
 140 to 141. Ditto.
 142 to 147. Ditto.

CHINESE.

148. Sword from Amoy. Donor H. Torrens, Esq.
 149. Chain-shot, with chain enclosed, from Chusan. Donor ditto ditto.
 150. Standard from the Bogue Fort. Donor ditto ditto.
 151-152. Two Bows, (deposited.)
 153. A Quiver, with 30 arrows, (ditto.)
 154. A three barrelled Pistol, found in the Chief Commissioner's house at Chusan, October, 1841. Donor J. C. Hutchinson, Esq.
 155. A Cross Bow found in the Gun Carriage Manufactory, Chinhae, October 1841. Donor ditto ditto.
 156. A Quiver from Chusan, taken August, 1840. Donor ditto ditto.
 157. A Tartar Bow from Ningpo. Donor ditto ditto.
 158. Eleven Arrows, taken from the Arsenal in Chusan, August 1840. Donor ditto ditto.
 159. A Helmet of a Tartar Soldier, taken from the Arsenal in Ningpo. Donor ditto ditto.

SOUTH SEA ISLANDS.

- 160 to 163. Spears.
 164 to 173. Clubs from the Friendly and Feejee Islands. Donor Capt. Dillon. As. Res. XV. App. 9.
 174. Club from New Zealand. Donor ditto ditto.
 175 to 173. Manicolo Clubs. Donor ditto ditto.
 174 to 198. Clubs.
 199. Paddles and Oars.
 200. Battle Axe of whale-bone, answering to a carving knife, from New Zealand. Donor Capt. P. Dillon.
 201-202. Green Zade (Axe-stone) Battle Axe. from ditto ditto. Donor ditto ditto.
 203. Stone Battle Axes. Donor ditto ditto.

- 204 to 205. Stone Battle Axes from Mangeer a Island. Donor ditto ditto.
 206. Stone Battle Axe, from New Zealand.
 207. Copper Shield.
 208. Wooden Shield.

EUROPEAN.

209. Sword of Her Highness The Begum Sumroo, which she had worn from the year 1778, to the day of her death, and which was always kept by her bed-side. Donor Mr. Dyce Sombre.
 210. Spanish Gun.

Read the following letter, dated Paris, 2nd February, 1843, from Major A Troyer:—

Paris, 2nd February, 1843.

MY DEAR TORRENS,—I had the pleasure of sending you a letter by Baboo Dwarkanath, who must have arrived in Calcutta sometime ago. Now, I avail myself of the opportunity offered me by Mr. Oatley, of the Madras Cavalry, who goes to India via Marseilles and Suez, &c.

In my last letter to you, I touched upon some points, upon which I shall be very happy to receive a few lines from you. How is the copying of the Vedas for the French Government going on? It is now a considerable time since the Asiatic Society of Paris has not received the least communication from you. You cannot imagine what pleasure every thing which comes from Calcutta, causes here in Paris. No. 123 is the last No. of your Asiatic Journal which we received. The political and military affairs in India having now taken a very advantageous turn, it may be expected that some more attention will be bestowed upon peaceable and literary pursuits by some of the many distinguished individuals who live in India. Will you have some more leisure to give us some tract of yours, or a printed edition of some oriental work? Mr. Brookhaus is a very respectable Sanskrit scholar, who sent you some time ago his edition of the *Vrihat Kutha*, with a German translation; he is since several years occupied with the study of Indian tales, and would be very happy to see an edition of the whole Sanscrit work published in Calcutta. I suppose Professor Wilson wrote to the Society about this subject, and recommended it to you as a very laudable undertaking. As to my own occupation—I can but repeat to you that I am still busy here in Paris with the printing of the English translation of the *Dabistan*, in three volumes, which I hope to be able to terminate in the course of this year. In my

last letter I took the liberty to request you to propose to the Society, the nomination of M. Julius Mohl as an honorary member; I beg to repeat my request, on the risk of being thought very intrusive, but not without hope to be excused and pardoned by you. The communication between India and France by the way of Egypt having become so easy and rapid, we may flatter ourselves to hear a little more frequently of you, and of the Asiatic Society of Calcutta; with this flattering hope, let me offer you my best wishes for the continuation of your health and happiness.

Yours most truly,

A. TROYER.

Read the following report from the Curator of the Museum Economic Geology, for the month of March 1843.

Report of the Curator Museum of Economic Geology, for the month of March.

Museum of Economic Geology.—I have the pleasure to announce in this month the discovery of copper ore on Round Island, a small islet off the S. E. end of the Island of Cheduba. The specimens exhibited were forwarded from Ramree by Captain D. Williams, Principal Assistant to the Commissioner of Arracan, who states that they were discovered by a Mug named Neokein, whom he had employed to search for coal. They consist of nodules of native copper, with red and black oxide and silicate of copper. The absence of the sulphurets or arseniates which I have not yet found amongst the specimens, render the ore of a very valuable kind, and if abundant, it will be of much importance. So pure is it, that Captain Williams sends with it a ring made from it by a native workman, which is on the table with the specimens. I have written to him for more abundant supply, and for details on the nature of the vein, rocks, and any other associated ores or minerals which may be found with it, from which some idea of its value as a mining site may be deduced, and due report made, to Government on the subject.

COPPER ORES.

No. 1604.

Ramree, Arracan, March 7, 1843.

MY DEAR SIR,—I now do myself the pleasure of submitting to you, the information you require regarding the copper ore I sent you.

It was obtained on Round Island, which on reference to a chart of this coast at the Marine Board Office, you will find to be an island on the East Coast of Chedooba Island, a little North of Flat Island. There is fresh water on the island, and ships may anchor close to it; plenty of fuel procurable at the spot. The ore was found by digging

for it, and I hope soon to be able to send you specimens of the rock and soil in which it is imbedded.

With regard to the volcano: on a former eruption I forwarded a specimen of a fish thrown up by the volcano, (so the natives say,) to the late Mr. Prinsep, which is now in the Museum of the Society.* The volcano hill is close to Kyouk Phyou, and Mr. Howe will no doubt forward to you what you want.

Yours truly,

D. WILLIAMS.

I forward all the copper ore I can *now* procure from Neokein. He will proceed to dig for more, and bring specimens of the earth and stones.

Having addressed the Sudder Board of Revenue N. W. P. as follows:—

The Secretary of the Sudder Board of Revenue, N. W. P.

SIR,—I am directed by the Committee of Papers of the Asiatic Society to request you will be pleased to submit to the Board, or to the proper authorities, their application for a complete set of the Revenue Survey Maps of the various districts under the Government of Agra, for the use of the Museum of Economic Geology of India, of which the objects are briefly detailed in the circular herewith.

2. As also that the Board will be pleased to assist the objects of the institution by distributing to its various officers the accompanying circulars (of which more will be sent if desired) with its recommendation of their object, as being a matter of the highest import to the financial interests of the country.

I have the honor, to be, &c.

*Asiatic Society's Rooms,
The 23rd Feb. 1843.*

(Signed) H. PIDDINGTON,
*Acting Secretary, Asiatic Society,
and Curator Museum Economic Geology of India.*

I received the following reply, and the district Maps sent are now upon the table. Our best thanks are due to the Board for its very liberal assistance, and I anticipate with confidence, from the numerous opportunities which its officers have before them, many important additions to our stores.

No. 31 OF 1843.

From H. M. ELLIOT, Esq. Secretary to the Sudder Board of Revenue, N. W. P. Allahabad, to H. PIDDINGTON, Esq. Acting Secretary Asiatic Society of Calcutta.

SIR,—I have the honour to acknowledge the receipt of your letter of the 23rd

* I regret to say that it cannot be found.—H. P.

ultimo, and to inform you that as requested therein, a set of the Lithographed Maps noted below has been forwarded to your address for the Museum of Economic Geology.

2. The Printed Circulars, received with your letter, have been distributed to Commissioners of Divisions.

I have the honor, to be, &c.

Sudder Board of Revenue, N. W. P.

Your most obedient servant,

Allahabad, the 14th March, 1843.

H. M. ELLIOT, *Secretary.*

List of Maps.

1	Map of Ghazeepoor, on Drawing Paper, colored.
1	ditto „ Benares, ditto.
1	ditto „ Jaloun, ditto.
1	ditto „ Jounpoor, ditto.
1	ditto „ Allahabad, ditto.
1	ditto „ Futtehpoor, ditto.
1	ditto „ Cawnpoor, ditto.
1	ditto „ Humeerpoor, ditto.
1	ditto „ Bandah, ditto.
1	ditto „ Agra, ditto.
1	ditto „ Etawah, ditto.
1	ditto „ Muttra, ditto.
1	ditto „ Furruckabad, ditto.
1	ditto „ Barreilly, ditto.
1	ditto „ Bijnour, ditto.
1	ditto „ Shahjehanpoor, ditto.
1	ditto „ Moradabad, ditto.
1	ditto „ Budaon, ditto.
1	ditto „ Pillibheet, ditto.
1	ditto „ Delhi, ditto.
1	ditto „ Paneeput, ditto.
1	ditto „ Hurriannah, ditto.
1	ditto „ Goorgaon, ditto.
1	ditto „ Bhutteeanath, ditto.
1	ditto „ Meerut, ditto.
1	ditto „ Boolundshuhur, ditto.
1	ditto „ Moozuffurnuggur, ditto.
1	ditto „ Seharunpoor, ditto.
1	ditto „ Goruckpoor, ditto.

- 1 Map of Allygurh, on Drawing Paper colored.
 1 ditto ,, Dehra Doon, ditto.
 1 ditto ,, Mynpooree, ditto

Mineralogical and Geological Department.—I mentioned in my report of February the notice which I had incidentally received of the brilliant eruptions of the small volcano of Kyook Phyoo, and that I had written to Mr. Howe for details and specimens. These he has very kindly furnished, in replies to my queries, and a chest of specimens of great interest, of which a selection is now on the table.

I am busy examining these, and the results of my work will form a separate paper.

It seems probable, that the mud and the grey shale are nearly the same substance and the grey shale and brick-red clay slate certainly are so ; for we have one specimen which is grey shale at one end, and brick-red clay slate at the other, with the dark, half calcined-shale in the middle, thus shewing that the metamorphic process had just reached so far. This is not uncommon where dykes have penetrated argillaceous shales ; but I am not aware of any instance in which it is known to be actually going on as it here appears to be, except that it may be supposed to be so in burning coal mines.

Another remarkable singularity in these specimens, which I may briefly notice here, is the low heat of the volcanic flame. Mr. Howe's letter says distinctly, that the station at midnight was rendered as light as day by the flame from the volcano though at 3 or 4 miles distance ; and yet we find that the specimens from the sides of the crater are barely calcined, and nowhere approach to fusion. There is no doubt, that the different mud volcanos on Ramree are truly volcanic *fumaroli*,* as may be seen by reference to Lieut. Foley's paper in Vol. iv. of our Journal, and the value of this fact consists in the confirmation which it affords of Mr. Lyell's surmise as to the ancient volcanos of the Eifel. I forbear further remarks here, as in our conclusions so much must depend on the mineralogical character of the specimens which are yet under examination.

We have received from Dr. Harlan, the splendid collection of casts of new Missouri-an fossils, which is now on the table. His letter to our associate Dr. Huffnagle, who has placed it in my hands as Officiating Secretary, is as follows :—

Philadelphia, July 21, 1842.

DEAR SIR,—It is a long time since I have had the pleasure of hearing from you directly, and an opportunity now offering from our port, I seize the occasion to address you, and of forwarding through you, a collection of the casts of fossil bones found in Missouri, and of which I have made a new genus of extinct quadrupeds ; a printed notice of these bones accompanies them, as also some other specimens duly labelled, which I beg the Asiatic Society to accept from me as a slight testimony on my part, to the liberal manner they treat their foreign members. I have been absent

* Though not affording sulphureous or saline exhalation.

two years in Europe since I heard directly from you, and on examining my copies of the Asiatic Journal, I find the following numbers have never reached me; viz. 77, 78, 79, 81, 82, 83, 86, 87, 88, 89, 90, 97, 98, 99.—No. 113, is the last come to hand; perhaps you could by application, obtain for me the completion and perfection of my copy of this valuable publication. And if you could aid me by sending for my cabinet any specimens in the department of Comparative Anatomy, you would confer a great favour. I was so unfortunate, during my absence in Europe, as to lose all my anatomical collections by fire, the labour of twenty years. The Professors of the Garden of Plants in Paris, on receiving intelligence of my great and irreparable loss, presented me with a very fine nucleus to form another cabinet, and I am emboldened to ask assistance of all my friendly Correspondents.

A full account of my new fossil bones, *Orycterotherium Missouriensis*, is not yet published, as it will be I hope soon with plates, when I shall not fail to send copies to foreign Correspondents.

As regards specimens in Comparative Anatomy for my cabinet, which is intended to illustrate a series of lectures on Comparative Anatomy and Physical History of Man, any bones, fossil or recent, or casts of them, would not come amiss, but I am particularly desirous to obtain skulls and teeth.

R. HARLAN.

The following Gentlemen were proposed and elected as Members of the Committee of Papers, for the current year 1843; viz.

Vice-Presidents.

Right Rev. the Lord Bishop of Calcutta.

Sir J. P. Grant.

Sir H. W. Seton.

H. Torrens, Esq.

Members.

Lieutenant Colonel W. N. Forbes,

W. P. Grant, Esq.

Lieut. A. Broome of the Horse Artillery.

C. Huffnagle, Esq.

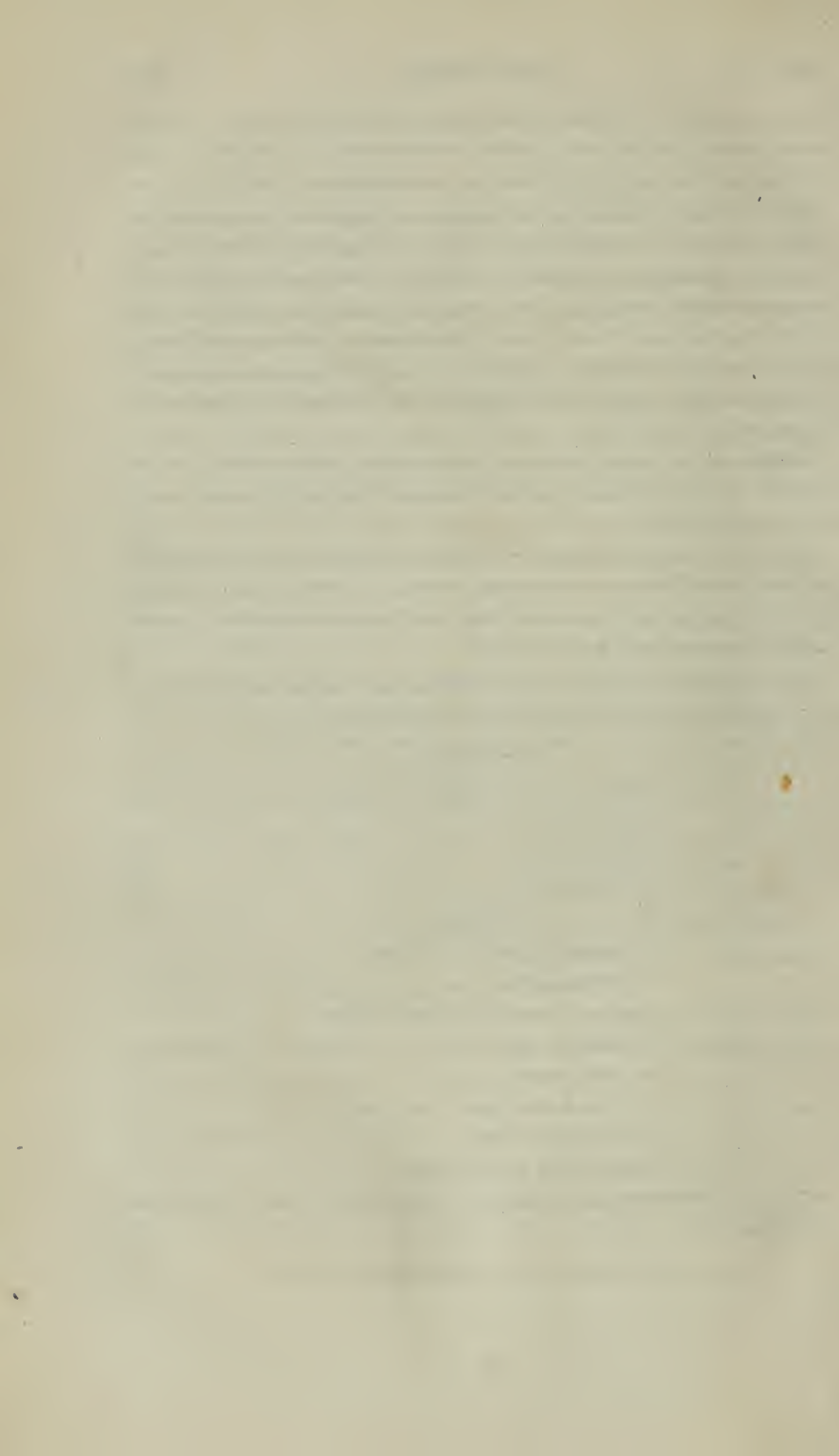
Dr. J. Hæberlin.

N. B. E. Baillie, Esq.

S. G. T. Heatly, Esq.

Baboo Prosono Coomar Tagore.

For all the presentations and contributions, the thanks of the Society were accorded to the Donors.



JOURNAL
OF THE
ASIATIC SOCIETY.

AN EIGHTH *Memoir on the Law of Storms in India, being researches relative to the Storm in the Bay of Bengal, at Madras, and in the Arabian Sea, of 22d to 31st October, 1842, with two charts.*
By HENRY PIDDINGTON.

On the 24th October 1842, a severe hurricane was experienced at Madras and other ports on the Coromandel Coast, in which several ships were wrecked or foundered at sea, and much other damage was done. It is the object of the present memoir to trace out the track of this storm, which, there is no doubt, crossed the Peninsula, and is traceable from the Andaman Islands to latitude 14° N., longitude 60° E., or within 6 degrees of the Island of Socotra, an extent far exceeding that to which any Indian Storm has yet been tracked.

The principal sources of information which I have, are from the documents forwarded to me by Captain Biden, the Master Attendant of Madras, who has been most indefatigable in profiting by the advantages which his official position afforded him. It is, therefore, to his zeal in the cause of science, that we mainly owe this memoir; for what I could collect in Calcutta, was so meagre; that it would have been but of little avail in tracing the storm as we have now done.

From the Peninsula, I have reports from Captain Campbell, Revenue Surveyor South of India, Captain Newbold, M. N. I. Assist. Comr. Kurnool, Mr. Crozier, Collector at Malabar, M. Bourgoin, Governor of Karical, and Mr. Buist in charge of the Observatory at Bombay. These gentlemen have been most indefatigable in their endeavours to procure

me all data within their reach, or that of their friends, and I am much indebted to them for their most ready assistance. I have as usual, noted with every document the sources from whence it was obtained.

I commence, as in my former Memoirs, by giving the documents, abbreviated as much as is consistent with clearness and accuracy of detail; and of these I have first chosen those farthest to the Eastward. I shall then give comparative tables, and lastly, a general summary and remarks, shewing upon what data, and according to what probabilities, when data do not exist, the tracks and storm circles of the charts are laid down. The general reader I trust, finds this part quite *readable*, and the mariner and man of science will be able to judge of the correctness of my inferences from the documents. I shall be greatly obliged by their remarks and corrections from any part of the world; and if at times I may seem to have registered too many details, it will be remembered that all details, and these given with fidelity, are the essential elements for the successful investigation of every complex physical problem, and most especially those relating to a new branch of meteorology.

Abridged Log of the Brig WATERLOO, Capt. Moore, reduced to civil time. Forwarded by Capt. Biden.

20th October.—At daylight strong breezes N. N. E. hazy weather, several water spouts to the South-west and N. E., with a heavy swell from the N. E. Little Andaman at noon N. E. Latitude $10^{\circ} 16' N.$, longitude Chron. $92^{\circ} 23' E.$ P. M. Winds N. N. E. to N. E. to midnight. Sunset squally. Midnight strong squalls

21st October.—Daylight fresh breezes, to noon, when Lat. $11^{\circ} 52' N.$, longitude Chron. $91^{\circ} 16'.$ P. M. fresh breezes N. N. E. increasing to midnight.

22d October.—1 A. M. fresh gales N. N. E., daylight increasing, down top gallant yards and masts, and prepared for bad weather. 8 A. M. heavy gales N. E. with squalls and rain, heavy sea running, and vessel labouring much. Latitude $13^{\circ} 27' N.$, longitude Chron. $90^{\circ} 03' E.$ 1 P. M. heavy gales, squalls, rain, and sea to midnight.

23d October.—Midnight wind East, more moderate. At daylight more so, all sail set by noon, when Latitude $14^{\circ} 45' N.$, longitude

Chron. $28^{\circ} 55'$ E. The wind South, S. E. and S. S. E. squally and variable to midnight.

24th October.—Midnight to noon, fresh breeze and cloudy. Noon, Latitude $14^{\circ} 44'$ N., longitude $86^{\circ} 38'$ E.

Abridged Log of the Ship LADY FEVERSHAM from Calcutta to Bombay, reduced to civil time. From Capt. Biden.

22d October.—At noon, by log worked back from 24th, lat. $12^{\circ} 45'$ $\frac{1}{2}$ N. long. $86^{\circ} 5'$ E. P. M. increasing winds with a squally appearance, N. and N. by W. to midnight. At 11, blowing a gale, midnight wind increasing with lightning, furling the foresail, from noon to midnight had run 80 miles S. by E. and S., and 7 miles more to 1 A. M. of the 23d, placing the ship at midnight in lat. $11^{\circ} 26\frac{1}{2}'$, long. $86^{\circ} 22'$ E.

23d October,—At 1 A. M. finding it impossible to run the ship longer, clued up the main top sail. At 1h. 30m. blowing a complete hurricane, when the ship broached to the wind. Bar. at 2 P. M. of 22d, 29.70. At 11 P. M. 29.40. and at 1 A. M. of 23rd 28.40. At 1h. 45m. P. M. blowing a dreadful hurricane at N.; the main and mizen masts fell over on the starboard side, carrying with them the fore top mast; cut away the wreck as quick as possible, and cleared the mast from the ship's sides. At 2h. 45m. the wind suddenly lulled, when the ship fell off and rolled in a most dreadful manner; a sea struck her abaft, which stove in four of the upper stern windows, washing away all the bulk heads in the cuddy, luggage, medicine chest, and every possible thing, however well secured. At 3, the wind shifted to the South and blew furiously, so that no one could stand on deck; lost quarter boats, hen coops, binnacles, bulwarks, and sails fore and aft, the long boat nearly filled, and all the stock drowned. At 3h. 30m., the hurricane at its greatest force. Bar. at 28.30. At 5h. commenced to abate, mustered all hands and found the chief mate and one seaman seriously injured, sounded the pumps at three feet and six inches, turned to and pumped her out. The main yard having fallen through the deck on the starboard side, was the cause of so much water being in the ship, boused it up and secured the hole, cleared and cut away the remainder of the wreck; still a heavy sea, but wind gradually abating. At noon strong winds at E. S. E. with heavy squalls and rain, all hands employed getting prepared to make some sail. At noon lat. observed $12^{\circ} 4'$ N. P. M. strong winds

and squally with less sea, all hands employed clearing away. At sunset pumped ship at two feet, squared the fore yard, and made all clear for getting some sail up. Midnight moderate winds at E. S. E., ship's head from N. N. E. to N. E.

24th October.—Day-light bent the fore sail, and fore top mast stay sail, set them, the mizen gaff towing astern got it in, and rigged it for a fore try sail. Noon moderate weather, with occasional squalls of rain. Lat. observed $13^{\circ} 16'$ N. long. by Chron. $86^{\circ} 85'$ E. Course made from Saturday at noon N. 16° W. 32 miles.

The following abstract of the Log of the Ship WHITBY, alluded to by Capt. Biden, was subsequently forwarded to me by that gentleman, but unfortunately the place of the vessel is nowhere noted. Captain Biden thinks, she must have been about 30 leagues to the Eastward of the LONDON, but how far South we are ignorant. I have thus not marked her position on the chart. It is possible that the Brig alluded to was the ANN METCALFE, though in her Log the loss of the fore topmast is not alluded to, and a note indorsed on the extract says only, that she had "SPRUNG a topmast, and put in to refit." I suppose "lost" may have been intended. With the ANN METCALFE also, the shift takes place at noon, and with the WHITBY at about 9 A. M. though in such weather the time is seldom exactly noted.

On the afternoon of the 22d October, the weather was hazy, with moderate breeze at N. N. E. The appearance to windward was such as North country seamen call "*greasy*." The Barometer fell in the course of the day from 30.10 to 29.90, the breeze increased during the night with occasional showers, and veered to N. N. W. At midnight, the Barometer 29.78. About 3 A. M. 23d, the storm commenced at N. N. W., increasing until 7 A. M., when it blew a perfect hurricane, veering to N. N. E. and N. E. with lightning; the Bar. now fell rapidly, and at 8 A. M. stood at 28.45, having fallen 1.65 in 20 hours. At 9 A. M. after a most violent gust at E. N. E. it suddenly fell a dead calm. *A Brig was then in sight without a fore topmast.** A large number of birds of the Petrel genus alighted on board, and

* Possibly the *Ann Metcalfe*, as above.

took shelter in the boats and under hencoops. At 10-30, the wind sprung up suddenly from S. W., veered to South, and 11-30 to S. E., and again blew with increased violence, accompanied with rain; the Bar. rising slowly. At 1 P. M. the Bar. rose rapidly, the storm gradually abated with heavy rain, and at 6 P. M. settled down to an ordinary gale, at which time the Bar. was 29.86. Throughout the night, the wind gradually abated, and at sunrise brought fine weather, with a steady breeze at S. E. which continued throughout the day. The Bar. rising to 30.15.

This short account will enable you to compare the time and direction of the storm as it occurred at Madras, and I hope to add to the facts necessary to elucidate the theory of storms. It appears to me, that from the sudden changes and extreme violence of the wind, I must have been near its vortex at the time whence it gyrated towards your coast, as it certainly did not extend any distance to the Eastward. I have only further to add, that although I have twice encountered hurricanes in the West Indies, I do not think they surpassed the late storm in violence when at its height.

I sustained but little damage in my spars, but lost most of my sails, also a seaman, and one of my boats, which last was blown completely over the poop from the davits.

WM. LACY *Whitby.*

NOTE.—Subsequent to closing my letter, I find on reference to my Journal, that the Barometer fell to 27.45. at 8 A. M. October 23, which makes the fall of mercury 2 inches and 65-hundredths, a change I have rarely experienced even in high latitudes, in so short a period. This fact is further corroborated by the account of Surgeon Tait, who at my request took note of the changes.

The following letter I received when this Memoir was nearly ready for the press, giving an account of the foundering of the Ship WASHINGTON, Capt. Barnes, in consequence of injury sustained in the Storm. I am indebted for it to Messrs. GLASS and Co. of Calcutta.

(Copy.)

Messrs. Glass and Co.

On board Sir Robert Peel.

GENTLEMEN,—I deeply regret to have to inform you, that the *Washington* foundered in the Bay of Bengal on the 25th October, in long.

86° 14' E. lat. 13° 29' N. from the effects of a dreadful hurricane on the 22d from the Eastward, in which she was dismasted. We were received on board the *Sir Robert Peel* of Aberdeen, David Craig, Master, from Calcutta, bound to London, on the 25th, but six of the crew were received on board the *Lord Glenelg* on the 1st November. About one-half of the sugar was pumped up before we left her, and the rest all damaged, as well as the hides and turmeric. We had only time to save part of the stores and clothes. I lost the most of mine, and what was saved, are damaged with salt water. Although we saw next morning after the disaster, a vessel of 6 or 700 tons with only the fore-mast standing, I do not think it was of great extent, at least in a Northerly direction, as the *Robert Peel* had fine weather on the 22d, with a heavy swell, by which she carried away her fore-top-mast and main topgallant-mast; at the time she was distant in a Northerly direction about 180 miles from us. Had the *Washington* continued tight, we might have got in with the land about Madras, the nearest port; but as every one had to take his share of pumping by day and night to keep her from sinking, none could be spared to rig jury-masts, and get the sails bent; in fact every one was almost worn out before we got on board the *Sir Robert Peel*.

I close this to say, that we arrived here yesterday, and sail to-day, and hoping this will find you well.

St. Helena, Jan. 4, 1842.

D. BARNES.

Log of the Brig ANN METCALFE, J. Errington, Commander, reduced to civil time. Forwarded by Capt. Biden.

22d October.—Saturday, noon, commences with moderate breeze from the N. E. with thick hazy weather, and occasional showers of rain. Barometer 29.70. At 4 P. M. increasing breeze with continued small rain. Barometer 29.60. At 8 P. M. wind still increasing, with a strong sea from the Northward. Barometer 29.40. Midnight very thick with constant rain, both wind and sea increasing fast from the Northward. Barometer 29.20. Thermometer 75°.

23d October.—Sunday, at 4 A. M. wind increased to a gale from the Northward, with a tremendous sea; at 8 A. M. it blew a complete hurricane from the Northward, the sea running very high. Bar. 28.70.

Noon, wind lulled for the space of half an hour, and shifted to the South, and blew a hurricane from that quarter also, which caused the sea to run up in the shape of a cone, making it very dangerous for a ship to live in. Lat. account $12^{\circ} 0'$ North, longitude $85^{\circ} 30'$ East. At 4 P. M. wind still at South, with a tremendous heavy sea, ship laying to, under bare poles, as no canvas would stand to it. Barometer 28.50. At 8 P. M. a little more moderate, but sea still very high. Barometer upon the rise 28.80.

Midnight cloudy, but more moderate, and sea falling; made sail to trysail and foresail. Barometer still rising and 29.00.

24th October.—Monday at 4 A. M. wind from the S. S. E. still moderating, and sea going down. Barometer 29.20.

At 8 A. M. wind still from the S. S. E. and moderating fast, sky beginning to break through the clouds. Barometer 29.50.

Noon, moderate and fine, clear sky, with sea decreasing, wind at S. E. latitude observed $12^{\circ} 6'$ N. longitude Chron. $84^{\circ} 30'$ E.; ship arrived at Madras on the 29th October.

JOHN ERRINGTON,
Commander.

Abridged Log of the Ship LONDON, from Madras to Moulmein, reduced to civil time. Forwarded by Capt. Biden

22d October.—P. M. to midnight, fresh breeze from N. E., and increasing with squalls. Ship standing to the E. S. E. about 22 miles in the 12 hours. Bar. 29.75.

23d October.—A. M. strong breeze N. E. increasing with squalls, and heavy head sea. At 6, wind N. N. E. At 8, increasing gale with heavy gusts, close reefed topsails. Bar. 29.80. Ther. 81° . Noon, strong gale, frequent violent squalls and heavy sea. Bar. 29.70. Lat. by account $12^{\circ} 56'$ N. long. $83^{\circ} 55'$ E. P. M. wind N. E. increasing; frequent heavy squalls, lying to with head to the S. E. 4 P. M. Bar. 29.70. 8 P. M. wind E. N. E. Midnight heavy gale with frequent violent squalls.

24th October.—1 A. M. Bar. 29.50. At 2, wind marked S. E. with the same. At 6, wore to the N. E. Noon Bar. 29.70. to 29.50.*

* So in the MSS. I do not find it mentioned that there were two, and the Bar. cannot I think have varied so much in the squalls. I suppose the meaning to be, that between midnight and noon the Bar. had risen from 29.50. to 29.70.

Ther. 81°; fresh gales, but made some sail. Lat. by indifferent observation 12° 34' N. long. 83° 44' E. P. M. wind E. S. E. strong breeze. At 8 P. M. more moderate. Midnight fine. Bar. 29.50.

25th October.—Fine wind S. E. Lat. 13° 20' N. long. 84° 70' E. Bar. 30.05. Ther. 82° or 84°.

Abridged Log of the Barque SARAH, Capt. Walker, reduced to civil time. Forwarded by Capt. Biden.

The *Sarah* by her log worked back from noon of the 24th, appears to have been at noon 22d October in about lat. 14° 52' N. long. 83° 24' E. At 1 P. M. of which day a steady breeze from N. E. sprung up, increasing to a fresh breeze with cloudy weather, and a heavy sea at midnight; wind N. E.

23d October.—Daylight increasing N. E. wind, with a turbulent sea. Noon, Bar. 29.73. Lat. account 14° 07', long. account 84° 24' E. Squalls increasing in rapidity and violence, till a little after noon she hove to. P. M. wind N. N. E., blowing a gale. 6 P. M. N. E. tremendous sea, vessel laboring greatly.

Barometer as follows; viz.

1 P. M.	29.70
2 „	29.65
3 „	29.62
4 „	29.56
6 „	29.60.

24th October.—A. M. wind veering from N. E. by E. to East. At 4 P. M. Bar. 29.63. At 7, 29.68. At 8, 29.73. At 8 A. M. moderated a little, and veered to E. by S. wore and scudded; wind East. Noon strong gales E. by S. Lat. observed 13° 34' N. long. observed 83° 53' East. At 2 A. M. passed a large ship, which had lost all her topmasts.

Abridged Log of the Barque STALKART, Capt. A. R. Dixon, from Colombo to Madras.

22d October.—At noon in lat. 12° 10' N., long. account 80° 33' E.* Fresh breeze N. by E. and cloudy, *high sea from the N. E.* At 4 P. M.

* This longitude and those of the 23d and 24th are obtained by working back the log from the 25th, on which day only the longitude is given.

and in the evening threatening, made preparations for bad weather, wind marked N. E. At 3 P. M. wind "variable" to midnight, though the course is constantly E. by S. ; midnight fine.

23d October.—2-30 hard squall ; 3, sea increasing ; lat. by Rigel in Orion $12^{\circ} 03' N.$; by 5 A. M. hard gales N. N. E. 7-10, very threatening weather, secured every thing. Noon squally, and high turbulent sea, sun obscured. Lat. by account $11^{\circ} 33' N.$ long. account $80^{\circ} 58'.$ The wind Northerly, hard gales, every appearance of a hurricane. By 10 P. M. blowing a hurricane from N. N. W., sea rising in pyramids.

24th October.—4 A. M. wind veered to the Westward. At 6, marked West, blowing with great violence, sea making a clear breach over all, hove to with a tarpaulin in the mizen rigging. 10 A. M. wind W. S. W. Noon more moderate, sea not quite so agitated, thick and cloudy. No observation. Lat. by account $11^{\circ} 33'.$ long. $81^{\circ} 31' E.$ P. M. strong gales South, squally unsettled weather. At 6, more moderate. At midnight pleasant breeze.

25th October.—4 A. M. lat. by moon and Sirius $12^{\circ} 13' North.$ At noon lat. $12^{\circ} 46' N.$ long. $80^{\circ} 55' E.$

Abridged Log of the Bark FAVORITE, Capt. W. F. Wilkins, from Madras to Vizagapatam, reduced to civil time. Forwarded by Capt. Biden.

22d October.—Lat. at noon $12^{\circ} 12' N.$ long. $81^{\circ} 40' E.$ wind N. E. to 6 P. M. and N. by E. to midnight, squally at times with dark threatening weather.

23d October.—2 A. M. wind N. N. E. ; day-light to noon increasing to strong gales with dark threatening weather and every appearance of an increasing gale, for which all preparation was made ; wind from 8 A. M. to noon marked N. E. by N. No observation. Lat. account $11^{\circ} 49'$ long. account $83^{\circ} 35'.$ 8h. strong gales N. by E. At 6 P. M. very heavy, a man washed overboard from the poop, hove to with head to the Eastward. At 10-15, vessel laid on her beam ends with the top-rims in the water, cut away the lower masts, and righted her with 4 feet water in the hold, ballast and cargo shifted, and deck torn up by the fall of the masts, pumps choked, and rudder gone.

24th October.—Day-light still blowing heavily from the S. E. (the wind is marked N. by E. at 1 P. M. of 23d, but afterwards, though the time of change is not marked, it is stated to be at S. S. E.) noon more moderate. No observation. Lat. account $11^{\circ} 53'$ long. $83^{\circ} 35'$ E. 7 P. M. wind S. E. by S. At 10, moderating.

25th October.—Employed making a temporary rudder. This log ends somewhat abruptly, it being only stated that both Chronometers were ruined by salt water. I presume that the other instruments were also rendered useless, and thus no observed latitude or run is given. The positions are thus estimated from the Lat. and Long. given on the 22d, and the subsequent logs.

The LORD ELPHINSTONE.

The *Lord Elphinstone* which left this port on the 16th ultimo for Coringa, encountered a severe gale of wind on the 23d and 24th, in latitude $15^{\circ} 37'$ North and longitude $81^{\circ} 30'$ East, with a heavy sea running the whole time. The Barometer fell to 29.69, which is as low as it fell at this presidency (Madras.) The wind blew from N. N. W.* to East, at which quarter it terminated at 4 A. M. on the 25th. The good ship bore the gale well, having lost neither mast, spar, nor sail. She has since arrived at her destination.—*Madras Paper.*

The foregoing are the Logs of Vessels at sea in the Bay of Bengal.

I now give the information from Madras and the Coast, and then the Logs of the Vessels which put to sea from the Roads.

The following is an extract of a letter from Capt. Biden:—

Madras, January 3, 1843.

MY DEAR PIDDINGTON,—I had the pleasure to forward you by the *Enterprise* on the 28th ultimo, all the logs which I have collected since our gale of October 24th. I have been so much engaged, that I was prevented sending them sooner as I intended, and having so long delayed the transmission of these valuable records, I would not forego so favorable an opportunity as this per *Hindustan*. One advantage has been gained by the delay; viz. the possession of the *London's*

* NNE. is probably meant here.—H. P.

and the *Sarah's* log Capt. Atwood of the *London*, encountered the gale on his passage from this port to Moulmein, and the *Whitby*, which vessel sailed hence with troops for Moulmein on the 16th of October, (the *London* sailed on the 18th,) experienced a perfect hurricane; her sails were blown to shreds, and she lost her quarter boat, bulwarks, and one man washed over board. The commander of the *Whitby* told Captain Atwood, that the wind flew round to the Southward, that his Barometer fell down to 28, and that his vessel was for sometime in a critical situation. He promised to send me a copy of his log, otherwise Capt. Atwood would have obtained minute information; but I am sorry to say, the *Whitby's* log has not reached me. I believe the *Whitby* was about 20 or 30 leagues east of the *London*. As she sailed two days before her, the description of weather the *Whitby* encountered, and her disasters, tally very much with what was experienced by the *Lady Feversham*, and I believe she was not far from the *Feversham* during the gale. I hope the information I have been enabled to gather together, will furnish you with such authentic statements of the extent, duration, and the character of the remarkable storm to which all the logs relate, as can well be collected. I am of opinion that Pondichery was the central position by land,* as it blew a complete hurricane there, and was by no means so violent at Negapatam. The log of the *Lady Clifford* details the weather at that southernmost point, and to the Westward of Madras there was no indication of a severe gale. Official and private reports forwarded with the logs shew, that the Barometer did not descend below 29.70, and a rise was visible about 4 P. M. The gale commenced here about 8 A. M. on the 24th, and then the Barometer was at 29.89. We had smart squalls the preceding night, and much rain, and except at intervals from 6 A. M. till about noon, the weather was thick and hazy, with much rain, however, only two vessels remained in the roads after eleven. The *Dauntless* slipped at noon, and the *Emerald* brig, having got down her yards, and riding heavily, cut away her masts at 3 P. M., the sea then making a fair breach over her, with two anchors ahead, from one of which she parted; she rode out the gale. It blew fresh, and at times in hard gusts. The wind was from North to N. by E. till noon, N. N. E. at 2 P. M. and veering from N. N. E. to E. N. E. till 6.

* The centre passed a little to the north of Pondichery.

At 4-30, the Barometer indicated a rise, when the wind shifted to E. by S. and E. S. E. At 7, the Barometer had risen nearly one-tenth. At 8, it was at 29.84, the wind then S. E. and at 10, the weather cleared up, the moon rose about 10-30, and from that time till midnight we had moderate breezes from S. E. to S. S. E. and fair weather. I kept an anxious look-out on the *Emerald*, saw a light on board of her occasionally, and at 1 A. M. being well satisfied that she was safe, I left my office. You will observe by the logs of the respective vessels which slipped from the roads, how critically several of them were situated; for instance, the *Repulse*, *General Kyd*, and the *Amelia Mulholland*. I attribute their perilous situation to the want of due attention to those precautions which are laid down in clause 10 of our revised Port Regulations, copy of which I forward you.

The vessels named in the margin,* were wrecked between Cove-long and the Seven Pagodas. The Barque *Highlander* lost her rudder, the *Arethusa* and *Ganges* were too light, and were thrown on their beam ends, and it may be said, they literally drove on shore; but I am of opinion that the ship *Frances Smith* might have gained a sufficient offing to insure her safety if sail had been set and carried when she stood to sea; but unfortunately her courses were not bent, which might have been reefed, and carried the whole of the gale, whereas she split her fore topsail about noon, and under a treble reefed main topsail and a trysail, she was little better than lying to, and drifted fast to the Southward. The first cast of the lead at 7 or $\frac{1}{2}$ past 7, shewed the imminent danger of her position, and the accompanying deposition of an able seaman, who was one amongst the number saved from this unfortunate vessel, will shew what followed.

(Signed) C. BIDEN.

The following are the official communications from the Observatory, forwarded by Capt. Biden.

24th October.—At 8 A. M. Bar. Wind N. N. W.
 „ 10 „ N. by W.
 „ Noon 29.78. N. to N. by E.
 „ 2 P. M. 29.72. N. N. E.

* *Frances Smith, Highlander, Ganges, Ten, and Arethusa.*

24th October.—	6	P. M.	.. ..	N. E.
„	7	Blowing hard,	.. ..	E. N. E.
„	8	„	.. ..	E.
„	9	29.84.	.. ..	E. S. E.
„	10	„	.. ..	S. E.

Observatory, 24th October, 2 P. M.

The Acting Astronomer has the honor to forward to the Master Attendant, the register of the Barometer at this office, in continuation from noon of this day to the present time. He would state for the further information of the Master Attendant, that the Sympiesometer has commenced falling rapidly, and that every indication announces an approaching gale.

	H. M.				
Barometer at	0 30	.. ..	.. ..	29.7825.	
„	1 0	.. ..	....	29.7565.	
„	1 30	.. ..	.. ..	29.7530.	
„	2 0	.. ..	....	29.7260.	

Observatory, 24th October, 1842.

MY DEAR SIR,—I am happy to tell you, that the Barometer is steadily rising and Sympiesometer also. We have nothing to fear this evening. I think we must look out to-morrow. Barometer at this moment 29.8495.

Yours, &c.

(Signed) HENRY TAYLOR

The Acting Astronomer has the honor to inform the Master Attendant, that the Barometer has had a decided tendency to rise from 4 o'clock this afternoon; the results are in continuation from the last report.

Meteorological Journal, from 2 P. M. to 9.

1842.	Time.	Barometer.	Wind.
24th October.—	2 0 P. M.	.. 29.7260 ..	N. E.
„	2 30 „	.. 7105 ..	N. N. E.
„	3 0 „	.. 7100 ..	N. N. E.
„	3 30 „	.. 7230 ..	N. E.

24th October.—	4 0	„	..	29·7045	..	N. E. by E.
„	4 30	„	..	·7185	..	E. N. E.
„	5 0	„	.	·7390	..	E. S. E.
„	5 30	„	..	·7565	..	E. by S.
„	6 0	„	..	·7565	..	E. by S.
„	6 30	„	..	·7760	..	S. E.
„	7 0	„	..	·7995	..	S. E.
„	7 30	„	..	·8225	..	S. E.
„	8 0	„	..	·8400	..	S. E.
„	8 30	„	..	·8495	..	S. E.
„	9 0	„	..	·8525	..	S. E.

The late results shew a tendency to continued rising in the Barometer, the Sympiesometer is also rising, so that in all probability the worst of the gale has appeared for this night; at all events upon Col. Reid's Theory, the return of the gale may be felt before to-morrow.* The Acting Astronomer has made arrangements for a register to be kept throughout the night.

—————

*Abridged Report of Logs of vessels in Madras Roads, forwarded by
Capt. Biden.*

Brig COLUMBINE, Capt. Crisp, Madras Roads.

24th October, 1842.—P. M. strong gales, and a heavy sea running from the N. E., by midnight heavy squalls with rain. Wind N. E. At 4 A. M. ditto weather. At 7 A. M. close reefed the top sails, and double reefed the main trysail, and cleared the decks for sea. At 8 A. M. ditto weather. At 9-30 A. M. tremendous heavy squalls with rain, and having every appearance of a gale, slipped the chain at the 75th fathom shackle, and stood out to sea under the close reefed topsails and fore-top-mast staysail; most of the other vessels in the roads having slipped likewise. Wind N. E. At noon ditto weather with a heavy sea, the ship labouring much, and shipping a quantity of water on deck.

P. M. Commences with hard gales, and a heavy sea with tremendous squalls. At 2 P. M. wind E. N. E. At 4 P. M. wind East. At 8-30 P. M. the wind having gradually veered round to the

* So in MSS.

S. E. wore ship to the N. E. in 18 fathoms water, saw a blue light burning to the S. W. Midnight more moderate.

25th October.—At 4 A. M. made some sail, and stood in for the land. Noon light winds and passing showers. Latitude observations $12^{\circ} 37'$ North; after this time fine weather.

Report of the Barque SYMMETRY, Capt. F. D. Butler.

24th October.—At 9 A. M. blowing a heavy gale at N. by W., I slipped from my anchor and steered an East course until 2 P. M. wind continuing at North, and N. N. W. At 3 P. M. the wind shifted to N. E. blowing at times a perfect hurricane, altered course to S. E. A high sea running, ship laboring much. At 5 P. M. the wind in a heavy gust came from the East, and continued its violence, until 6-15 P. M., when it gradually abated, and drew to the S. E., continued on the starboard tack until 7-30 P. M. Wore ship then in sixteen and a half fathoms of water, and made more sail, rain descending in torrents. At 9 P. M. the wind veering more Southwardly, stood East until 6 A. M. then fine weather. Longitude by Chronometer $62^{\circ} 42'$ E. latitude $12^{\circ} 42'$. Wind South, experiencing a current of $3\frac{1}{2}$ to 4 mile per hour to the Southward, and from which date until my arrival in the Roads experienced fine weather.

Barometer 3 P. M. 29.60. and 29.10.

F. D. BUTLER,
Commander, Symmetry.

28th October, 1832.

Report of the Ship NEPTUNE.

24th October.—The gale commenced with rain and very thick weather. At 10 A. M. slipt. At noon, gale increasing, obliged to furl the fore-sail, then under close reefed main topsail, blowing terrifically, head then about S. E., and by S. making no head way, and gradually breaking off. At 4 P. M. it cleared a little, found the *General Kyd* and a brig close to us; At 6 P. M. ship's head off to S. S. W. wore ship immediately. At 9 P. M. saw the land astern supposed to be off Cove-long; it appeared very near us, I immediately made sail to get her off

the land, ship's head then about E. N. E. At 11 P. M. fortunately it moderated, and the ship came up to E. Midnight out of sight of land. Tuesday A. M. weather moderating and looking much fairer. At 1-30, made a little sail, at day-light moderate. Barometer and Sympiesometer standing 29.40, *it was no lower in the extreme of the gale*, continued to stand off E. and by N. At 8 A. M. fine weather. 9 A. M. atmosphere hazy, hot and sultry. At noon a light steady breeze from the Southward, found myself thirty-one miles E. of Madras, and seventeen miles to the Southward.

(Signed) W. F. KNIGHT,
Chief Officer, Ship *Neptune*.

Abstract of Log of the AMELIA MULHOLLAND.

23d October.—At noon the Barometer stood at 29.70, (never having been higher since lying here but one day, when it rose to 29.80,) the weather at this time bearing a threatening aspect, blowing a strong breeze from North; hauled all the cable on deck, veered to 82 fathoms, and saw all clear for slipping; the Bar. falling towards evening to 29.60, the wind increasing towards midnight with heavy squalls and rain to heavy swell setting in from the N. E., making the ship roll heavy.

24th October.—Commenced with strong winds and rain, with heavy puffs. At 5 A. M. the cable parted at 54 fathoms, the ship canting to the Eastward, made sail and stood out East, the wind increasing to a hard gale. At 10 A. M. the wind Eastering and the sea making fast, the ship laying off E. S. E. At 11, set the fore-top staysail to reach her off as much as possible. At noon it blew a hard gale with a tremendous sea, the Barometer down to 29.30, it having rained without intermission the whole morning.

Longitude 80° 38' East, latitude 12° 46' N. by account. At 1-30 P. M. it blew a hurricane, the ship lurching heavy, shifted the (shot and shell) ballast which gave her a tremendous list, making the ship quite unmanageable, carrying the helm hard a weather, the fore-topmast staysail split to pieces, and finding it impossible to take in the main trysail, sent the hands aloft, and cut it down from the gaff, bent another fore-topmast staysail, the gale moderating towards sun-set. The

Barometer inclining to rise. At 5 P. M. sounded in 28 fathoms, set the fore-top staysail to wear ship, but she would not pay off, sent the hands below to trim her, but the ship was labouring so heavy that very little was done. At 6-30, shoaling our water fast, set the reefed fore course, and tried to wear again, but this had no effect, sent the hands below again to trim over more shot. At 8, the gale having greatly moderated and the sea falling, set the double reefed fore-top-sail, but it had no effect, the ship still carrying the helm hard a weather; the water having shoaled to 15 fathoms, clewed up the head sails and brought up. At 9 P. M. in 10 fathoms veered cable to 60 fathoms and stowed sails, the gale moderating fast. Midnight moderate and cloudy; the Barometer having rose to 29.60, after which she had fine weather.

25th October.—Commenced moderate and fine, with a light breeze from the S. Eastward. At day-light found ourselves off the land about three or four miles, Sadras Hills bearing West.

Log of the Ship REPULSE.

The *Repulse* was lying in Madras roads, and at 8 A. M. slipped and put to sea, the wind marked N. N. E., course East. At 10, wind N. E. by E. Noon increasing. At 1 P. M. wind S. E. At 8 P. M. moderating, anchored in 19 fathoms. This ship's Barometer is marked as follows:—

At	8 A. M.	..	..	..	..	29.60
	10	,,	.	.	.	29.29
	4 P. M.	..	..	..	..	29.27
	6	,,	..	..	..	29.29
	8	,,	..	..	..	29.35
	10	,,	.	..	..	29.38
	12	,,	..	..	..	29.50

When the weather cleared up the centre of the Sadras hills bore N. W. by N.; she returned safely to Madras.

Log of the Ship PRINCESS ROYAL, Capt. C. J. Lorck.

The *Princess Royal* slipped and put to sea at 9-30 A. M. with a gale at N. $\frac{1}{2}$ E. at 6 A. M. and North varying to the Eastward in squalls when she slipped. She stood out to the Eastward of course, and at

Noon had the wind N. N. E. gradually hauling round to E. by S. At 5. P. M. varying to the South in the squalls to S. E. At 6½ Barometer marked at 29.40. This ship did not anchor, and returned safely to Madras.

Ship LADY CLIFFORD, *Capt. Miller.*

The *Lady Clifford* was at anchor off Nagore in latitude, 10° 48' N. and Capt. Miller, says in a letter to Capt. Biden :—

“By the accompanying extract from the log book of my vessel you will perceive, that the late gale, as far as it came under my observation, had all the characteristics of a circular storm, and that I skirted the South and S. E. range of it, at least I acted upon that supposition, and the result serves to confirm the opinion. It is probable, that I escaped much of its violence by not approaching too near to the centre of the storm, which I imagine must have been to the Northward of my position, and had I been bound to the Southward, I might possibly have avoided it altogether by steering to the S. W. instead of the N. E.

“If these great storms are regulated by a fixed law, the knowledge of it might be of infinite advantage to seamen, by enabling us to make the best of them, instead of being perplexed by the sudden changes and other phenomena, so much against the good management of a ship during their violence.”

I have inserted the log of this vessel without abridgement, as shewing how judiciously Captain Miller profited by his knowledge of the Law of Storms.

Extract of the Log Book of the LADY CLIFFORD.

23d October.—At anchor at Nagore. During this day it blew a fresh gale at North, the sky clear, and weather fine. Barometer 30.05. Towards evening a thick cloud or bank gathered in the N. E., and a long swell set in from that quarter. At 10 P. M. the whole sky was overcast, and the Barometer began to fall. At midnight the wind decreased, and drew round to the N. W. the swell from the N. E. still increasing, sky overcast, but not looking bad. Barometer 29.90.

H.	K.	Course.	Wind.	Bar.
1	...	...	...	29.90
2	...	...	...	29.85
3	...	...	...	...
4	...	...	...	...
5	...	...	...	...
6	...	...	...	29.85
7	...	...	...	...
8	3	N. N. E.	W. N. W.	...
9	4	N. E. by N.	...	...
10	5	...	...	30.00
11	6	N. E.	West	...
12	7	...	W. S. W.	30.00
1	8	...	...	...
2	8	...	S. W.	...
3	7	...	S. W.	...
4	7	...	...	...
5	7	N. E. by N.	...	29.70
6	7	...	S. S. W.	...
7	7	N. N. E.	...	...
8	7	...	South	...
9	7	...	...	29.80
10	7	...	S. S. E.	...
11	7	...	...	...
12	7	...	S. E.	29.90

24th October.—A. M. light wind from the land, sky overcast but fine. Barometer falling. Day-light same weather, cloudy but fair appearance, excepting the thick banks in the N. E. which grew longer and darker, and the N. E. swell still increased; not liking the appearance of the weather, weighed at 7 A. M. and stood to sea. Barometer began to rise, wind freshening at Westward. At 10, wind increasing to a gale, reefed the sails, and made the ship snug, pitched away the jib-boom, split main sail and carried away main topmast-stay. Noon it blew a whole gale, W. S. W. and a drizzling rain commenced, weather looking stormy, but Barometer still high.

4 P. M. gale very severe, could just steer before it with difficulty under close reefed topsails, sheeted *half home*, courses furled, top-gallant masts on deck. 6 P. M. the rain ceased, the sky broke into clouds, and Barometer began to rise. At 8, less wind, sky clearing. Midnight wind abating fast, out close reefs and set foresail, weather looking fine.

25th October.—Day-light fine weather, made all sail, &c. At noon in latitude 11° 9' N. longitude 80° 20' E. At Madras, latitude 12° 20' N. longitude 80° 55' E. Anchored in Madras Roads, at 6 P. M. on the 26th.

Abridged Report of the Ship GENERAL KYD. Forwarded by Captain Biden.

24th October.—At 8.30 A. M. blowing fresh from the Northward with heavy swell rolling in, and the Barometer being at 29.60, deemed it advisable to slip and stand out to sea. 9 A. M. slipped and stood to the Eastward under double reefed topsails. 9.45 breeze increasing fast. Barometer 29.54, close reefed topsails, wind N. Eastward, ship stands S. E. by E. Sails blowing to pieces, ship lying over much; lee gangway under water; stove in all the butts of water on lee side, and hove spare staves and cotton off orlop deck, into the hold. Barometer 29.49. Soon finding the gale increasing fast, tried to heave

the lee carronades overboard, but could not succeed. 12-30, in a tremendous squall, washed lee cutter away, battened hatches down. Water nearly up to main hatch coombings. Barometer 29.44. Sea terrific at 2 P. M. and ship drifting bodily to leeward; at 4 sounded 25 fathoms; attempted again to bend main-topsail without success, but bent the third stay-sail; wind E. S. E. ship heading S. by W. At 5 P. M. gale tremendous, and ship off to S. S. W. water 17 fathoms. Finding that we were drifting fast on shore, called hands aft, and stated that the only chance we had of our lives was to wear ship, at the same time telling them, that it would be no use doing so unless we got the main-topsail on her; the men with one consent said they would do their utmost, and with God's mercy we brought the sail to the yard after wearing ship. At 5-30 by 11 o'clock, the same night the least water at this time 15 fathoms; at 12 o'clock gale moderated and depth of water 18 fathoms; at 1 o'clock, 19 fathoms; at 2 o'clock, 20 fathoms; at day-light fresh breeze at S. Eastward, stood to the Northward out all reefs, and set courses. The Barometer 12 o'clock was 29.43; saw the land about Sadras.

THOMAS T. FEAD, *Chief Officer,*
Ship General Kyd.

Abridged Log of the American Ship FRANKLIN, Captain Richard,
reduced to civil time. From Captain Biden.

24th October.—The *Franklin* slipped and put to sea at 8 A. M., the wind at 9 A. M. marked N. by W. At 2 P. M. N. E., heavy gale throughout. At 7 P. M. wind E. S. E. and at 11 E. S. E.

25th October.—At 2 A. M. wind S. S. E. and moderating to noon, when latitude 12° 13' N. out of sight of land; she arrived safe in Madras roads with very little damage.

Abridged Log of the Ship DAUNTLESS, reduced to civil time. From
Captain Biden.

24th October.—Lying in Madras roads. At noon heavy gale veering from N. to N. N. E. with thick hazy weather. Slipped and stood to sea. Thermometer 80°. Barometer 29.40. P. M. wind

N. N. E., N. E., and East, at 4 P. M. in a tremendous heavy squall with rain. Thermometer 78. Barometer 29.30. At 6 wind, S. E. by S. $\frac{1}{2}$ S. veering to S. E. At 10, S. E. strong gale. At midnight decreasing. Barometer 29.40.

25th October.—Moderating from midnight. At noon latitude $13^{\circ} 00'$ N. longitude $80^{\circ} 30'$ East. Thermometer 84. Barometer 29.50. She returned safely to Madras Roads.

Abridged Log of the Barque MÉRMAID, reduced to civil time. From Captain Biden.

24th October.—Slipped and put to sea at 7 A. M. Wind at 7 North; at 8 N. N. E.; at noon N. E. by N; at 6 P. M. E. by N. veering S. E.; and Southerly by midnight, when clearing up. Barometer from 29.80; at 1. A. M. to 29.50; from 8 A. M. to 5 P. M. and 29.75 at midnight again.

Brig ARETHUSA.

From the declaration of the Chief Officer, forwarded by Captain Biden, it appears that she put to sea at 9 A. M. standing to the E. S. E. for 6 hours, when the wind “shifted suddenly in a heavy squall to the Eastward,” throwing the vessel on her beam-ends. The masts were cut away, and the vessel anchored in 7 fathoms, but the surf carried her on shore, when she was wrecked.

The FRANCES SMITH and Brig RUBY.

The *Frances Smith* put to sea, but appears either to have been too crank, or leewardly, or not to have carried sufficient sail to obtain an offing, and she was driven on shore and wrecked. The brig *Ruby*, a coasting craft, was also wrecked to the Northward of Madras.

From Pondicherry.

Captain Biden forwards me from this port several reports from residents, which I have printed below, and an official declaration before Captain Hostein, the Master Attendant of that port, relative to the loss of the *Antoinette*, Captain Prudhomme, and other vessels.

Reports from Pondicherry.

24th October.—The day the gale took place, the Barometer which had fallen on the previous day, rose at 8 o'clock to 28 inches and 2 lines. F (or 30.05 Eng.) At $\frac{1}{2}$ past 9 o'clock, it began again to fall gradually until noon, when it was at 28 inches, 0 lines, and 8 points (or 29.90 Eng). It continued to fall, and at 2 o'clock, at which hour a signal was made for vessels to get ready to put to sea, the Barometer was at 27 inches and 10 lines; (29.80 E) still falling, at 3 o'clock the wind was very strong, the sudden gusts becoming very fierce; the Barometer having somewhat further fallen. At a $\frac{1}{4}$ before 4 o'clock, the gale was blowing from N. E. to W. until 20 minutes past 5 o'clock. The Barometer was then at 27 inches and 2 lines, (29.15) when suddenly the wind became lulled until 6 o'clock, but afterwards it blew fresh from the S. W. During the calm, the Barometer fell below *storm*, but rose again in the evening.

Second Report.

24th October.—The Barometer had fallen to 26 inches and 10 lines, (28.65 E) two lines below *storm*, and remained thus from 20 minutes past 5 o'clock until 6, when the wind began again to blow strong from the S. W.

On the 2d instant, the Barometer was at 28 inches and 3 lines (30.1 E).

During the gale, the Barometer fell half an inch below what it did in the gale of 1830, and was stronger than any I remember in these parts.

It is to be remarked, that from 2 to 5 o'clock in the afternoon, at the most violent part of the storm, *the oscillations of the mercury* in the Barometer were so apparent, that it rose and fell instantaneously 2 to 3 lines, as though somebody had shaken the Barometer.*

It appears from the reports received, that the storm reached to the W. to the distance of 75 miles, consequently from 70 to 80 leagues from W. to E., for Captain Thevenard was not at the limit of the storm when he felt it, at 40 leagues to the East.

From S. to N. the storm does not appear to have made so large a zone, as it was not felt further than Porto Novo.†

* Italics are mine.

† This is an error, as it was distinctly felt at Nagore, a degree farther South.—H. P.

This gale in its course, was contrary to what it is generally; the wind blows from the N. W., flies round to the N. E. in passing by the N., and then to the E. and the S. This time the wind flew to the S. and S. E. in passing by the S. W. and it remained many days from the S. not strong, but the drops of rain were very large.*

Certificate from the Master Attendant of Pondicherry.

“ I, the undersigned do declare and certify, that the English bark *Antoinette*, Captain Prudhomme, arriving from Cochin and Tranquebar with a part of her cargo on board, anchored in the roads of Pondicherry on the 2d of October last.”

On the 23d of the same month, in the afternoon, the Captain was on shore, and the weather having assumed a bad appearance, the surf became so high that communications with the roads were interrupted. *On the morning of the 24th the Barometer had risen,*† and we thought that the weather had settled; nevertheless the surf was always very high, and Masula boats could not go through it.

There were in the roads, the English barques *Antoinette* and *Appolon*, the English brig *Cervantes*, the French brig *Le Mirabeau*, and the Dutch barque *Corsair*.

At 10 A. M. the Barometer began to fall, the wind was blowing moderately by squalls from N. W. to W. N. W. It was raining in the squalls. At noon the wind blew harder, the Barometer always falling. At half-past 12 o'clock the Dutch barque *Corsair* which was to windward of the *Antoinette*, dragged her anchor, and seemed to fall athwart the hawse of the *Antoinette*. The rain which was then falling, in great abundance, though the wind was not very strong, hindered us from seeing both ships, which after having appeared a moment together, separated themselves, and the *Corsair* had anchored on the larboard side of the *Antoinette* at a small distance. At 2 P. M. I made signals to the ships to get under weigh immediately. The sea was very high in the roads, and the ships pitched a great deal at anchor. From

* This, it will be seen, depends upon the storm passing to the North or South of the observer, as also upon its track.

† Italics are mine.—H. P.

half-past 1 o'clock P. M., it rained so heavily, that not a single ship could be seen, the wind was always from the same direction, and blew by squalls very strongly. The Barometer was always falling. At 4 o'clock P. M. a most violent hurricane had set in, the flagstaff and the trees which were in the streets of the town were broken and torn up by the whirlwind. At 20 minutes past 5 P. M., the wind from the N. W. to W. N. W. ceased on a sudden, and after a moment of calm, the hurricane began with a new violence from the S. W. to the South.

When the wind came round to the S. E. it began to abate, it was then 9 o'clock P. M., and during the night the wind became very moderate.

On the morning of the 25th, the weather became pretty fair and the sea was not high; the Brig *Cervantes* was recognized anchored six miles to the N. E. of Pondicherry, having only her lower masts standing; the Captain went immediately on board, and when he returned, he told me that his Chief Officer gave him the following report: The *Corsair* in dragging her anchor ran foul of the *Antoinette*, and carried away her bowsprit, and a little while after both of her top-masts went. Afterwards when both ships had separated, the *Antoinette* ran foul of the *Corsair*. Both ships seemed much to injure each other, for the sea was very high.

Of the five ships above named, two only came back into the roads, the *Cervantes*, and the *Mirabeau* which appeared on the morning of the 26th, having lost her main-mast, which the Chief Mate has been forced to cut away in order to lighten the ship, which was on her beam ends.

Having learnt that pieces of wreck had come ashore at about 12 miles to the North of Pondicherry, I informed the Captains of the five ships of it. Captain Prudhomme having gone to the place where these wrecks were lying, recognized amongst them several pieces belonging to the *Antoinette*.

These numerous wrecks which confirm the report made by the Chief Mate and crew of the *Cervantes*, leave no doubt of the loss of the *Antoinette*, which had on board the Chief Mate and a crew of 24 men; as well as her cargo, which was almost complete. The lower part of the mizen-mast of the *Corsair* having come ashore, we must

suppose that those ships have foundered in consequence of the injuries received when fouling each other. Since the hurricane, the breeze has constantly ranged at first from the S. E. and afterwards from the N. E., which would have brought them into the roads if they had been afloat. The hurricane of the 24th October extended itself to a great distance from Pondicherry, and on the same day ships have been dismasted at 200 miles to the east of Pondicherry, while five ships from Madras roads came on shore in the neighbourhood of that port.

(Signed) A. HOSTEIN,

Pondicherry, 1st December, 1842.

Master Attendant.

(A true Copy.)

(Signed) A. PRUDHOMME.

Storm at Pondicherry.

We are indebted to a correspondent at Pondicherry for a detailed notice of the storm of the 24th ultimo, as experienced in the vicinity of that town, from which we extract the following particulars: On the 23d the Barometer at 6 A. M. stood at 30 inches, but its fall during the day indicated an approaching storm. At 6 P. M. the sea was very rough, and during the night the waves rose to a great height. At 7 on the morning of the 24th, the raging of the sea was terrible. The sky was overcast with heavy clouds, especially in the North-East and North-West. At 8 A. M. the Barometer had fallen to about 29 inches, apparently indicating a hurricane. The surf was extremely violent, the waves breaking over the vessels, and at 8½ heavy rain commenced falling, and the wind set in from the North-West, both gradually increasing in violence as the day proceeded. The Barometer continued falling till 6 in the evening, the wind varying from North-West to South-West; about this hour there was a short period of calm, when the wind suddenly shifted round to the South and South-East, blowing from this quarter with as much fury as it had previously done from the opposite one. At 9 P. M. the wind moderated, and it gradually became calm. From 10 A. M. to 9 P. M., the rain fell in torrents, without ceasing. At the moment that the storm suddenly shifted to the South and South-East, the Barometer had attained its lowest

point of depression, the mercury having fallen to 28 inches, or "stormy," being half an inch lower than it has been observed since the storm of 1830. It was at 8½ P. M. that the mercury began to rise again.

In the morning, the following vessels were in the Roads: *Cervantes*, *L'Appollon*, *L'Antoinette*, *Le Mirabeau*, and *Le Corsair*. They put out to sea at 2 P. M. on cannon being fired as signals from the port. The *Mirabeau* and *Cervantes* returned with loss of masts and other damage, but the *Appollon*, *Antoinette*, and *Corsair* had not made their appearance, and great fears were entertained for their safety. The ship *Nouveau Tropique*, which had left two days previous for Madras, regained the Pondicherry Roads with much damage. The officers of the vessels which returned, reported that they had never witnessed so severe a storm; its ravages are described as extending inland for 18 or 20 leagues; in Pondicherry itself many houses were damaged, and two lofty chimneys of the manufactory of Messrs. Fontain and Co., 100 feet in height, were thrown down by the storm.

Coupling the above interesting particulars of our Pondicherry correspondent with the appearance of the storm here, where it was much less violent, and at Cuddalore, where a former correspondent seems to have conjectured very rightly, they had "but the tail of it;" the probable loss at sea of *three* vessels off Pondicherry, and the known wrecks of *five* near Sadras, with other casualties to the South, we are much inclined to arrive at the conclusion that the storm of the 24th ultimo was a true rotatory hurricane, whose centre or vortex was somewhere out at sea, between the latitudes of Pondicherry and Sadras—a conclusion to which we invite the attention of our scientific readers. We may add, that at Madras the wind at 10 A. M. was North and continued in this quarter till 2 or 3 P. M. At 4 P. M. it was N. E. by E. At 8 P. M. had moderated considerably. At 10 P. M. had shifted round to the South-East, and during the night became calm.—*Madras Spectator*, Nov. 5.

The Madras *Athenæum* furnishes the following further particulars of the late gale:—

"The following statement from the Master Attendant, details further mischief occasioned by the recent gale.

Intelligence from Porto Novo.

“24th October.—Brig *George* came ashore, fresh gales from the N. W.; 6 P. M. shifted to S. W.; midnight wind due South, much moderated; 3 A. M. 25th, fresh Southerly and S. W. breeze, with occasional heavy gusts.”

Having addressed Captain Campbell, Assistant Surveyor General, Southern India, to request that he would assist me in procuring such information as he could obtain to assist in tracing the storm inland, he has obligingly sent me in addition to his official report, those mentioned in the following extracts from his private letter:—

Ryacottah, 8th March, 1843.

“Ryacottah is in latitude $12^{\circ} 31' 20''$ N. longitude $78^{\circ} 4' 44''$ E. and by elevation is about 3145 feet above the sea, as deduced from the data of Col. Lambton's Survey.

I send you a set of observations with the Barometer made at Bangalore by Mr. Garrett, with the same instrument as before, he only remarks on the 25th, “Rain and tremendous wind at night.” These observations with both instruments are merely corrected for the peculiarities of the instruments.

The former observations were reduced to 32° , for an expansion of 0.018018 feet for each inch of mercury, and for 180° of temperature according to Dulong and Petit.

I enclose also some observations made by Lieut. Robertson, Superintendent of Roads near Patcheroopum in the Amboor valley, which place you will find in the 78th sheet of the Indian Atlas, to be about 34 miles S. by W. of Vellore.

I conceive the reason of the strength of the storm not being felt there arises from some high precipitous hills which shelter the plain of observation.* The instrument is a very fine one, but I do not know if it has been compared.

10th March.—I have this morning received from Capt. J. Green, the Superintending Engineer at Bangalore, a splendid draft of the storm, taken with Newmann's self-registring machine. You will see that

* I have no doubt this was the true reason, and that it might, as in the case of Gyah and Pooah, in my Seventh Memoir, Vol. XI, Jan. 8, have been *seen* overhead.—H. P.

there, as here, it began at North, but shifted to the West, in which direction and S. W. it was at its height from 12 to 2 of the night of the 24th. The pressure is I suppose pounds on a square foot. The wind then came back to North again at 10 A. M. of the 25th, and then to South suddenly at a quarter before 1 of the 25th, and at 5 P. M. shifted to East.

October.	Bangalore.		Ryacottah.	Difference.
12	27.231		27.219	— .012
13	27.215		27.183	— .032
14	— .223		— .191	— .032
15	— .178		— .153	— .025
16	— .180		— .137	— .043
17	— .176		— .139	— .037
18	— .133		.....	.....
19	— .137	At 10 A. M.	27.119	— .018
20	— .149		.....	.....
21	27.160		27.099	— .061
22	— .166		— .101	— .065
23	— .162		— .087	— .075
24	— .119		— .035	— .084
25	26.972		26.961	— .021
26	27.033		27.029	— .004
27	— .052		.....	.....
28	— .158		27.059	— .099
29	— .125		— .119	— .006
30	— .127		— .129	— .002
31	— .125		— .109	— .016
24th—4m.				
	26.972		26.939	— .033

The following Report has been kindly forwarded to me by the Magistrate of Mangalore.

Your letter of the 16th April, addressed to the Magistrate of Honore, reached me a short time ago. I have now the pleasure to send you some notes of the weather, from the 24th to the 27th October, 1842, kept in my office. The direction of the wind is probably not exactly correct, as there is no vane at the station.

The appearance of the sky was very disturbed on the 25th and 26th, and I felt certain, that a severe gale of wind must have been blowing on the opposite side of the Peninsula.

Notes of the Weather at Mangalore in October, 1842.

24th.—Heavy rain

25th.—Light showers with strong gusts } Thermometer maximum
of wind from the N. W... .. } 75°.

26th.—Cloudy, light showers, strong southerly winds.

27th.—Ditto ditto.

HENRY BLAIR,
Magistrate.

Abridged Report from the French settlement of Mahé.

Desirous of obtaining information from every possible point along the coast, I addressed M. Bourgoïn, the Governor of the French settlement of Mahé, requesting he would kindly collect for me all that could be gleaned there. The substance of his letter in reply is, that there were no regular observations registered by any person at that settlement, nor at Karical; but that towards the close of October 1842, no person recollects any particular bad weather, or such signs of it as might have indicated that a storm was raging elsewhere, and this is corroborated by those, who from time to time keep detached notes of remarkable changes. At Mahé, between the 23rd and 27th October 1842, nothing of note occurred in the appearance of the weather, or of the sea at Karical. The rains began on the 22nd October, but without any wind worth noting: the surf only was rather high.

Observations from Patcheroopum in the Amboor Valley, about 34 miles S. by W. of Vellore, or about Latitude 12° 22' N. Longitude 79° 6' E., and bearing from Madras about S. W. by W. 85 miles, by Lieutenant Robertson of the Madras Army. Forwarded by Captain Campbell, Assistant Surveyor General.

24th October.—8 A. M. Thermometer 73°. Barometer 28.798. Rain guage $\frac{27}{10}$ inches, wind N. E. with drizzling rain throughout the day. Squally at night.

	Ther.	Bar.	Rain Guage.	Remarks.
25th Oct.— 7 A. M.	73°	28.876		Cloudy, wind moderate.
„ 12 A. M.	75°	28.912	$\frac{2}{10}$	Ditto ditto.
„ 3 A. M.	75 $\frac{1}{2}$ °	28.886		Ditto ditto.

	Ther.	Bar.	Rain Guage.	Remarks.
26th Oct.—	7 A. M. 73°	28.936		Cloudy, with light wind.
„	10 A. M. 74°	28.944		Ditto ditto.
„	12 P. M. 77°	28.914		Ditto ditto.
„	3 P. M. 78°	28.904		Ditto ditto.
„	8½ P. M. 76°	28.944		Ditto ditto.

Official Report by Captain J. Campbell, Assistant Surveyor General.

1.—From the end of September, the Barometer was observed to have gradually risen daily, which in this situation generally indicates approaching rainy weather, and accordingly on the night of the 12th October, a fall of 2.4 inches of rain took place, the Barometer standing at 27.095 inches, having risen from 26.862 inches on the 28th September: both observations being made at 10 A. M.

2.—From the 12th October, the Barometer gradually fell again until at 10 A. M. on the 23rd October it stood at 26.971 inches, when there was but little wind, clear blue sky and Cirri; but before noon, the wind had increased from N. E. bringing with it moist air which gradually condensed in Cirro Cumuli, and then Nimbi. In the evening the wind had lulled again, but in the night it again increased in strength; and at sunrise of the 24th, was blowing strong at N. E. with an overcast sky, but no signs of rain. At 10 A. M. the Barometer stood at 26.927 inch, with the wind falling again, and a little drizzling rain. At 4 P. M. the wind was high at North with drizzling rain. Barometer 26.820 inches. About 7 P. M. after dark, wind began to increase with rain from North; and between 8 and 9 o'clock, had become strong enough to blow in some cracked panes of glass in a window in an exposed situation. Observations of Barometers forgotten in the confusion of securing doors and windows for the evidently approaching gale.

3.—Early in the morning of the 25th October, the Barometer stood at

1½ A. M. 26.648 inches, gale at its height from the North. Tiles from the houses beginning to fly. Little rain, sky overcast. Thick in East and South; in North an uncommon light in horizon, as if shining under an arch in a canopy of mist about 2° in altitude above the horizon.

- 3½ A. M. 26.636 inches. Wind at East, many tiles blown off houses on North and East sides. Dark in North. The uncommon light in East. Thick in South and misty with rain.
- 6½ A. M. 26.740 inches, wind veered to S. E. lulling a little, rain heavy.
- 7 A. M. 26.778 inches.
- 7½ A. M. 26.788 inches.
- 8 A. M. 26.812 inches, wind at South, much fallen.
- 9 A. M. 26.832 inches, wind very much fallen, but still high, mist and drizzling rain, wind seemed veering Westerly.
- 9½ A. M. 26.854 inches, wind a strong breeze, mist, no rain.
- 10 A. M. 26.864, wind strong at S. E. fog and mist.
- 11 A. M. Fog risen and a little sunshine; air particularly clear, wind light.
- 4 P. M. 26.793, overcast sky, wind high, rain about in showers. Barometer observations discontinued. The minimum pressure observed by two instruments. The observations given are corrected and reduced to 32° Fahrenheit. Instruments the same as last report.
- 4.—On the 26th October, the Barometer stood 10 A. M. 26.932 inches, morning misty and wet, wind fallen rapidly, blowing as usual from N. E.
- 4 P. M. 26.839, Blue sky, Cumuli and Nimbi.
- 5.—After the 26th, the Barometer rose again as gradually as it fell. It must be remembered, that however easy it may be to the practiced seaman to note on the sea shore, or in flat country, the direction of the wind; yet among the vast granitic mountain masses of a country like this, it is by no means easy to tell with certainty, even within 3 points, from which quarter the wind is blowing: its direction being as often *up and down* as any other.

J. CAMPBELL,

Ryacottah, 9th January, 1843.

Asst. Surveyor General.

Captain Newbold of the M. N. I., Assistant Commissioner at Kurnool, has favoured me with observations from Bangalore, Bellary, and Hydrabad, and with some suggestions of his own, of which I shall avail myself at length in the Summary, which as usual, will follow the

detail of the observations. From the notes forwarded by Captain Newbold, it would seem that at Hydrabad, nothing of note was experienced. At Bellary, latitude about $15^{\circ} 6'$ N. longitude $77^{\circ} 5'$ E. the Barometer fell from the 23rd October to the 27th, from 28.65 to 28.55* (height of the station above Madras not given,) and by the 29th had risen again to 28.65. The weather cloudy at times, and the winds from N. to NE. and NW. to the 25th, and then for four days from the SE., but the weather quite fine. At Bangalore on the 25th October, a good deal of wind and rain, almost a storm, the direction not noted. This we have from Capt. Green's observation, as forwarded by Capt. Campbell, and mentioned in the extracts of his letter, page 366.

The following Notes are extracted from a second letter from Capt. Newbold, who has also obliged me with some views, which will be found at length in the Summary.

Since my last, answers have come to my queries from the Southward, decisive of the truth of my supposition of the current's having passed over the peninsula in an easterly direction, to the great gap of Coimbatore, thus bursting through the lofty ghaut barrier upon the Arabian Sea and islets immediately opposite. It was felt severely at Salem, $11^{\circ} 41'$ N. Lat. blowing from the N. E. right in the direction of the gap, and clearly proving the Southerly direction imparted to part of this Easterly blast by the contour of the hilly barrier.

At Madura, $9^{\circ} 57'$ N. Lat. or $1^{\circ} 44'$ South of Salem, the storm was not felt in the least, nor at Paumban $9^{\circ} 18'$ N. Lat. on the coast, where the weather on the 4th and 5th October rather finer than it had been. On the 5th, wind from S. W., fresh breeze with lightning from N. W. from 7 to 11 P. M., and wind from same quarter on the 6th October; wind a little stronger and from same quarter, and a little thunder and lightning at the same hour. On the 7th, the wind was light, thunder and lightning as before. No barometrical remarks made. Those of the Thermometer have nothing worthy of remark.

It is evident, therefore, that the storm did not extend so far South down the coast as Paumban, and from its not being felt at Madura, probably not so far as Point Calymere.

* See in following page the observations from Bombay.

For the information condensed above, I am indebted to Mr. Fischer, and Messrs. Cadenhead of Salem, Dr. Gill of Madura, and Lieut. Robertson at Paumban.

From F. H. CROZIER, Esq. Sub-Collector, Malabar, I have received the following letter and report.

DEAR SIR,—With reference to your letter of the 16th date, I have the pleasure to enclose the remarks entered on the records of the Master Attendant's Office at Tellichery, and regret being unable to procure you more particular observation of the appearances and variation of the Barometer, &c. during the period you specify. I at the time alluded to, happened to be officially engaged, about 25 miles to the North of Tellichery on the coast, and immediately in the rear of Mount Dilly, a lofty hill, as you are aware, projecting into the sea, and forming almost the only safe anchorage and harbour during bad weather on this coast. I remarked at the time that it was *most unusually* filled with Pattamars, (the craft of the coast,) and was given to understand they sought refuge from the bad weather at sea and on the coast. The sky looked very stormy at the time, but I do not recollect any intimation of the vicinity of a gale further than being prevented myself, on the 29th of October, from crossing, as I am accustomed to do, the Bar at the entrance of the Cavery river close to Mount Dilly, by the extreme violence of the surf. I had crossed the Bar a few days earlier in the month. I was detained for two or three days after and before the 29th.

Yours obediently,

F. H. CROZIER,

Sub-Collector, Malabar.

Malabar, 6th May, 1843.

Date.	<i>Winds during the past Week.</i>	<i>Weather during the past Week.</i>
	October 1842.	Tellicherry.
23rd	Light breezes, the Westward, }	Fine during the day, towards evening squally over the land.
“	Light breezes variable, N. W. to S. W., and S. E. during the night, .. }	Cloudy, with lightning at intervals.
24th	Light land and sea breezes, }	Fine during the day, towards evening squally over the land.
“	Light breezes variable, N. W. to S. W., and S. E. during the night, .. }	Cloudy, with thunder, lightning and slight showers at intervals.
25th	Moderate breezes, the Westward during the day, }	Cloudy, with drizzling rain.
“	Strong breezes, the S. W. during the night }	Cloudy, with lightning and slight showers at times.
26th	Strong breezes variable, S. E. to South during the day, }	Cloudy, with slight rain.
“	Strong breezes, the S. W. during the night, }	Cloudy, with drizzling rain.
27th	Fresh breezes, S. W. during the day, .. }	Cloudy.
“	Fresh breezes, S. W. during the night }	Cloudy, with lightning and drizzling rain at intervals.
28th	Fresh breezes, S. W. during the day, .. }	Cloudy.
“	Fresh breezes, S. W. during the night, .. }	Cloudy.
29th	Light breezes, the Westward during the day, }	Fine.
“	Light breezes variable, S. W. to W. during the night, }	With passing clouds and lightning.

From the Bombay Times of 9th November.

THE MADRAS HURRICANE.—We gave in our last numerous extracts from the Madras papers of the 25th, in reference to the hurricane which occurred on the preceding day. On examining the meteorological records of the Observatory, we find that the first manifestation of this atmospheric disturbance prevailing in our neighbourhood—for here, unless in the heavy swell which extended to the harbour, we had no actual symptoms of storm till the evening of the 30th—became apparent on the 25th; we had then some lightning in the evening, with a rather troubled sky towards the eastern horizon, and the barometer fell about .030. This state of depression continued till the 29th, long before the thunder-storm and rain of the 31st, of which scarcely any prognostication was given, when the mercury had rallied to its usual level. The following note gives the means, the maxima and minima, and the range of a large standard barometer by Newman; the obser-

vations are corrected for temperature to 32 deg. F., and for capillary attraction:—

	October	24th	25th	26th	27th	28th	29th
Mean of 24 hours' observation, ..	29.720	.699	.643	.626	.665	.732	
Maxima,	29.810	.788	.712	.675	.722	.791	
Minima,	29.664	.620	.659	.573	.609	.691	
Range during 24 hours,		146	188	053	102	113	100

From this it will be seen that the day of greatest mean, as well as of greatest minimum, depression, was the 27th;* the day of least range, when the ordinary bi-diurnal fluctuations of the barometer were most affected was the 26th, when the range was about half what it ought to have been, the interval betwixt the maximum and minimum being only .053. The Madras papers give the barometric readings uncorrected, and do not note the temperature so as to enable us to apply the correction, whereby we should have been enabled to give an exact comparison of the fall of the instruments here when the influence of the storm reached us, but nothing more, as compared with that of the Madras barometers where it was raging round. It must be kept in mind that at 10, or rather at 9-45 A. M., the barometer is at its maximum, and at 4 P. M. it is at its minimum elevation, and that in the finest weather the range betwixt these two hours amounts to about .150. On the 24th ult. it stood at Madras, at the first named of these hours, at 29.873; and at the second, at 29.7054: so that the total depression amounted to 1626, or to about one-hundredth of an inch over the average. The mean of 700 hourly observations during the month of September gives .094, as the average range at Bombay betwixt the hours of 10 A. M. and 4 P. M.; the depression at the former of these corrected, as formerly stated, 29.676, that, at the latter, being 29.582. If these circumstances be overlooked, the barometer will appear to be on the rise or fall just as it happens to be examined, not more than five hours before or after 10 A. M. or P. M., the hours of maximum elevation. Were vessels, when in port, any where in the neighbourhood of a meteorological observatory, to have their barometers and sympiesometers corrected and rated by some recognized standard, it would greatly enhance their value as monitors of approaching storms, and enable meteorologists to avail themselves of the logs and records kept at sea, to an extent which at present it were vain to attempt.

* It will be noted also that this 26th and 27th was the day on which the *Lucy Wright's* storm was nearest to Bombay.—H. P.

The indications of scarcely any two barometers exactly agree; and betwixt the tropics, where the total range scarcely exceeds three-tenths of an inch, the most delicate movements of the mercury must be watched. In marine barometers, besides, the correction for the rise of the quicksilver in the cistern can very rarely be made with any approach to accuracy, and scarcely ever, in any two instruments, however similar, precisely corresponds. It depends upon the relation of the diameter of the tube to that of the cistern, the latter varying not only in different instruments, but in different portions of the same: this invariably makes the observed depression less than what it ought to be. It is still worse with the sympiesometer, whose indications of pressure are so complicated by high temperatures, that unless to those long familiarized with it, it is of little value between the tropics. These imperfections would in a great measure be remedied, were the observer in possession of a schedule of corrections which he could at any time apply. These considerations, if considered of value, might be tested here by the Indian Navy; and we have no doubt would be productive of important results. The instruments, indeed supplied by the Company, especially the thermometers, are often of such indifferent quality, that unless rated or corrected, they are comparatively of little use. Instead of lumbering about amongst arsenal and naval stores, they ought to be placed where they could be taken care of and kept in order; where their excellencies could be pointed out, and their imperfections remedied. It would appear incredible were it stated, that the efficiency of a very able and experienced engineer corps is in many cases neutralized by the wretched economy that refuses to supply instruments fitted for service! Yet we have been told of an extensive district under the supervision of a very able officer, where levelling and general surveying is constantly required, where there is not a level or theodolite fit for the common purposes of road-making; and where, in consequence, the services of highly-gifted and well-paid officers are impeded or thrown away for a consideration, which would not amount to a single week of the pay and allowances!

The Madras gale was encountered by the *Seaforth* Ceylon steamer off Cochin, at 10 P. M., on the 25th; it dismasted the *Lucy Wright*, near Mangalore, on the 26th;* the *Futtay Salam*, from Calcutta, was overtaken and nearly swamped by it, close to the Laccadive Islands;

* In the following extract it is said on the 27th.

the *Cleopatra* steamer encountered it on her way to Aden, and the *Semiramis* had a midshipman washed overboard when on her voyage from the Persian Gulf. We should feel greatly indebted to any officer whose vessel had been exposed to it, if he would favour us with an extract from his log, as to the time when, the place where, and circumstances under which the gale, or its symptoms, were experienced by him.

The Ship LUCY WRIGHT.

Letters have been received from Captain Pollock of the *Lucy Wright*, bound from Liverpool to this port, announcing that his ship, was totally dismasted on the 27th ultimo, in a hurricane in lat. 13° 2' N. and 71° 39' E.

The *Lucy Wright* was off Rutnagherry on the 4th instant, and the Captain mentions that her hull has escaped uninjured.

The hurricane appears to have occurred about the same time as that which has done so much damage at Madras, and as it attacked the *Lucy Wright* in the same latitude as Madras, it is not improbable that it was one and the same gale.—*Ibid.*

Extract from the Log Book of the ship HIGGINSON, nautical time from a Newspaper.

28th October.—Barometer fell at 6 A. M. from 29.40 to 28.50. Lat. 18° N. Long. 70° 20' E. "Very heavy gale from West to South with thunder, lightning and much rain, all sails furled, and ship hove to, continued so for six hours, when it began to abate."

Abridged Log of the ship FUTTAY SALAAM, from Mauritius to Bombay. Forwarded by G. BUIST, Esq. H. C. Astronomer at Bombay, reduced to civil time.

24th October.—Noon to midnight light breezes W. S. W. to W. N. W. and fine.

25th October.—From noon winds W. N. W. to N. W. and fine, three and four knot breeze, noon Lat. 7° 55' N. Long. Chron. 68° 14' E. P. M. moderate, 4 to 7 knot breeze, W. N. W. to N. W., increasing at midnight and "a chopping sea getting up," steering to the N. by E. through-out.

26th October.—Midnight to noon 6 to 7 knot breeze, with heavy N. W. swell, “ship plunging much at times.” Noon Lat. acct. $10^{\circ} 16'$ N. Long. $68^{\circ} 54'$ E. 8 M increasing fresh gales W. by N. At midnight S. W. going from 4 to 6 knots to the N. by E. At midnight a gale at S. W. making all snug, vessel making much water.

27th October.—The gale increasing to a hurricane at S. S. W at 4 A. M. when hove to. At 9 A. M. wind marked southerly. At 6 A. M. “blowing complete hurricane, ship perfectly unmanageable, lashed the helm a lee. Tarpaulins in the main and mizen rigging to keep the ship to.” Noon gale increasing with a very high sea, vessel straining much. Lat. by acct. $11^{\circ} 55'$ N. Long. $69^{\circ} 09'$ E. The ship lying to, wind marked S. E. blowing a furious hurricane with a tremendous high sea. At midnight gale, but more moderate.

28th October.—A. M. moderating, but still dirty with violent squalls and heavy rain. Daylight, (6 A. M.) moderating fast, at which time “bore up N. West to clear the Byramgore Shoal.” At noon Lat. acct. $13^{\circ} 31'$ N. Long. acct. $68^{\circ} 09'$ E. After which fine weather.

The logs end here somewhat abruptly; that is to say, they are not copied up to one having an observation for Lat. and Chron. which is always desirable, for by working the log both backwards and forwards the vessel's true place is better ascertained, and much light is thrown on the action of the currents generated by the storm.

From the Bombay Times.

We subjoin a very interesting notice from Dr. MALCOLMSON of the effects of the Madras hurricane of the 24th of October, for such we have no doubt that it was, off the Arabian coast, where it appears to have reached on the 30th:—

To the Editor of the Bombay Times.

SIR,—In your paper of the 30th ultimo, you requested communications in reference to the late Madras Hurricane, which appears to have swept over a large space, and to have been very destructive in its progress.

Since the publication of Colonel Reid's work on the Law of Storms, the subject has attracted, much attention both in a philosophical,

maritime, and practical point of view. Agreeing with the Colonel, that much good would result from the rotatory motion of Gales being understood and acted on by commanders of vessels, when caught in tempests, with this object in view, every authenticated fact that bears on the subject should be carefully collected for future deductions. On this account, I send you a few particulars of the gale or hurricane the ship *Seaton* experienced on her passage from Aden towards Bombay, in which she was dismasted, narrowly escaped foundering, and regained the port with great difficulty under jury masts, leaky, and her hull so much injured, that she has been condemned by survey.

After leaving Aden, the *Seaton* had moderate breezes from the Northward, with clear weather; for two or three days before the gale was felt, they had a very uneasy, broken and turbulent head sea, with light northerly winds, which enabled them to carry royals and main sky sail.

On Sunday the 30th of Oct. P. M., the breeze gradually increased so much, as to require the smaller sails to be stowed, top sails double reefed, main sail and jib also stowed, wind N. and by West. The atmosphere, at this time, had a streaky, hazy, troubled appearance. Barometer falling. When the vessel first felt the head sea, the Barometer indicated atmospheric derangement, but not to such an extent as to induce any apprehension of an approaching gale.

The Barometer being a tried one, led to the belief that rough weather was to be expected, and preparations were accordingly made to meet it. On Monday the 31st, being then in Lat. 14° N., Long. 61° E., whilst in the act of taking in all sail, and having succeeded in getting the top-sails and foresail clued up, and foretop sail partly stowed, the hurricane burst in all its fury. In an instant every stitch of canvas was blown from the yards; even the mainsail, though well secured, was blown from the gaskets, went to pieces, and was entirely lost; as likewise every other sail that was stowed. At 9 A. M. the main top-gallant-mast went by the cap; at 11, the quarter boat was blown away, with one of the iron davits; at 12, the hurricane still increasing and blowing in furious gusts, the ship was thrown nearly on her beam ends. Ballast shifted, water washing up to the lower deck beams, the sea at this time running high and making a complete

breach over her,—and from the shifting of her ballast and quantity of water in her hold, she appeared to be bodily settling down. Barometer still falling, and the danger imminent; the main mast was cut away, after which she righted a little, and rose lighter to the sea, but still with a heavy list to starboard. From the great straining of the ship, the water continued pouring in through every seam. At 2 P. M. the foretopmast was carried away a foot above the cap. At 3, the foremast went, four feet above deck, carrying every thing with it; part of the wreck falling across the long boat and pinnace, stove both at nearly the same time. The mizen-topmast gaff, and spanker boom fell on deck, leaving nothing standing above board but the mizenmast. From the exhausted state of the crew, the heavy rolling of the vessel, and the sea continually breaking over her, it was found impossible to clear away the wreck, which, also striking under the counter and different parts of the vessel, threatened serious consequences. Sunday 1st November at day-light, the wind lulled a little. At 8 A. M. the hurricane recommenced with redoubled fury. The wind which before was N. and by W. suddenly shifted to the E. S. E. and settled at E. N. E. Sea breaking over her fore and aft, making a clear sweep of the deck. It is a matter of surprize and congratulation, that none of the men were washed from the pumps, which were kept incessantly going during the intervals of the sea; the spray was flying so furiously and thick, that the forecastle could not be distinguished, and every part of the body that was exposed, smarted from its effects.

On Sunday night the 30th, the Barometer fell to 29.7. During the height of the gale its lowest range was 27.6. The 1st Nov. it rose to 28°: it began to rise four hours before the gale moderated. 2nd, moderate breezes, sea going down, all hands engaged in clearing away the wreck, and getting up some spars as jury masts. Got her before the wind and bore away for Aden, where she arrived on the 15th in a very shattered state, crew exhausted from having been constantly at the pumps.

It is worthy of remark, that during the hurricane, for such it was, the wind which was N. N. W. at its commencement, veered to the Westward, backed round to the E. S. E. and E. N. E. This agrees perfectly with Reid's now generally admitted theory, of the circular and

progressive motion of storms. It was fortunate that the *Seaton* was on the proper tack when the wind changed; had it veered forward instead of aft, before the loss of her masts, it is more than probable she would have gone down by the stern, as many ships are supposed to have done in similar hurricanes.

On Sunday evening, the 30th October, there was neither cloud nor fog-bank in the western horizon, yet the sun went down fiery red and contracted in appearance. His rays instead of glancing obliquely across the waves, seemed to dip and lose themselves almost perpendicularly in the long heavy swell. During the height of the storm the rain fell in torrents, the lightning darted in awful vividness from the intensely dark masses of clouds that pressed down, as it were, on the troubled sea. In the zenith there was visibly an obscure circle of imperfect light of 10 or 12 degrees. When the hurricane took off, the scene to leeward was awfully grand,—thick masses of the darkest purple-coloured clouds were rolling over each other in inconceivable confusion, tinged and lighted up in different places by intensely vivid lightning. The hoarse roar of the retiring storm, mingled with the hollow growl of continued thunder, as they slowly retreated with the gale, left an impression on the mind not easily to be forgotten; the respiration of every person on board was affected: this is to be accounted for by the electric state of the atmosphere with which all hurricanes seem to be intimately connected, if not entirely excited and influenced thereby. The lowest range of the Barometer was 27.6. At Bangalore, in which appears to have been the same gale, it fell to 27.4;* but as the *Seaton* seems to have been in the centre of the hurricane, or nearly so, it is very probable that it fell quite as low as 27.4, or even lower. It is a matter of regret, that the state of the Thermometer was not noted. The hurricane will likely be found to have crossed the Persian Gulf, in about the latitude and longitude of Bahrin.

I subjoin an Extract from the Log of the Barque *Chieftain*, which vessel you will observe was not far from the *Seaton* on the 31st.

29th October.—Lat. $7^{\circ} 52'$ N. Long $55^{\circ} 54'$ E. Light airs, cloudy weather, sea calm.

* This is without correction for the altitude of the stitum.

30th October.—Lat. $8^{\circ} 26'$ N. Long. $56^{\circ} 46'$ E. Wind N. E. and by E. Light breeze, cloudy.

31st October.—Lat. $9^{\circ} 40'$ N. Long $57^{\circ} 6'$ E. Wind N. N. W. and N. W. and by W. Light breeze, cloudy.

1st November.—Lat. $11^{\circ} 12'$ N. Long. $57^{\circ} 15'$ Wind N. by N. $\frac{1}{2}$ N. to N. W. by W. $\frac{1}{2}$ W. Moderate breeze, cloudy.

2d Nov.—Lat. $13^{\circ} 5'$ N. Long $57^{\circ} 15'$ E. Moderate breeze, cloudy, heavy head-swell, ship plunging deeply; ship's head N. and by W.; took in the small sails. Breeze moderate, cloudy, dark gloomy appearance, with vivid lightning; latter part squally with heavy rain. P. M. wind W. by N. veered round to W. S. W. and S. W. By this it is evident, the *Chieftain* met the sea occasioned by the same tempest.

The accounts received up till this date, from different parts of the Arabian coast, convey intelligence of a great number of vessels having been lost in the same hurricane. These have been large buggalows, principally belonging to subjects of the Imaum of Muscat, conveying dates, &c. from the Persian Gulf to Aden and different parts of the Red Sea. Fifty-one vessels have been lost to the Northward of Cape Issolleta and between it and Ras-el-had, nine to the Southward of Gardafui, ten between Shabal and Aden; making a total of 70 vessels, the crews in most instances saved.

At Aden, the weather from the 29th October till the 8th November was stormy, cloudy, and unsettled; the tides rose higher than I have known them to do for the last four years; winds from E. N. E. to E. S. E. During this time a heavy sea rolled into the Eastern, Molkut and Bundera-mar bays, which made it impossible for any vessel to have ridden at anchor in either place with any degree of safety. Not having had a Barometer, I cannot say how it was affected; but am of opinion, it indicated the neighbourhood of the hurricane.

The Ship *Maria* left Aden for Bombay two days before the *Seaton*, and arrived at Bombay on the 7th November, having been one month on the passage. An extract from her log shewing her Lat., and Long. and weather met with, from the 29th Oct. till 2nd Nov. would be interesting, and assist in tracking the extent of the hurricane.

I am, Sir, yours faithfully,

JOHN P. MALCOLMSOM,

Aden, 27th December, 1842.

Surgeon, Political Residency.

Before entering on the Summary of the grounds upon which I have laid down the tracts assigned for this storm in both the accompanying charts, I give for the Bay of Bengal, where we have many ship's logs to consider, a tabular statement. I have not thought it worth while, for the few data which we unfortunately have for its progress over the peninsula and in the Arabian sea, to add these to the table; of which the object is to present with more clearness the corresponding states of the weather over a large extent of ocean at the same time than can be done by the mere descriptions.

Tabular View of the Winds and Weather for the Madras Storm of 23d October, 1842.

Date.	Names of Place or Ship.	Winds and Weather.	Lat. N.	Lon. E.	Bar.	Ther.	Simp.	Remarks.
Noon, 21st Oct. 1842.	Brig Waterloo, AT MADRAS.	NNE. to NE. Fine.	° ' 10 16	° ' 92 23	..	..	..	{ To Midnight squally and in- creasing.
Noon. 22d Oct. 1842.	Brig Waterloo, Lady Feversham,	NE. heavy gale, N. and NbW. squally,	13 27	90 03	..	..	..	{ The same throughout; Mid- night, wind East.
	Ann Metcalfe,	Moderate, Noon increasing to Midnight from North,	12 45½	86 5	..	..	..	Increasing to Midnight.
	London,	To Midnight fresh NE. squalls,	..	..	Midt. 29.20	75	..	{ Sea from the North, small rain and thick weather.
	Sarah,	1 P. M. breeze from NE. fresh- ening to Midnight,	14 52	83 24	..	..	..	{ Ship standing to the ESE. or towards the Storm.
	Stalkart,	NbE. p. m. NE. increasing and variable	12 10	80 33	..	..	..	High sea from the NE.
	Favorite,	Fine. NbE. to Midnight and squally, dark threatening weather,	12 12	81 40	..	..	..	..

Date.	Names of Place or Ship.	Winds and Weather.	Lat. N.	Lon. E.	Barometer.	Ther.	Simp.	Remarks.
Noon, 23rd Oct. 1842.	Brig Waterloo,	Fine P.M. West South,	14 45	88. 55	..	..	..	By Noon all sail set.
	Lady Feversham,	South, furious Hurricane from Midnight to 6 A. M. Noon moderate ESE.	12 04	...	29.70 to 20.40	..	..	At 1½ A. M. dismasted.
	Ann Metcalfe,	4 A.M. gale and Hurricane from the Northward, Noon lulled, P.M. South, Hurricane,	12 0	85. 30	8 A.M. 28.70 Noon 28.50 8 P.M. 28.80 Midr. 29.10			
	London,	Noon strong gale, NNE. and heavy gusts, P.M. NE. 4 P.M. ENE.....	12 56	83. 55	6 A.M. 29.60 Noon 29.70 4 P.M. 29.70			
	Sarah,	NE. to NNE. P.M. Noon hove to, increasing gale, 6 P.M. NE.	14 07	84. 24	29.73	..	..	{ Bar. 1 P.M., 29.70; at 2, 29.65; at 3, 29.62; at 4, 29.58; at 6, 29.60.
	Favorite,	NNE. to NEbN. at Noon strong gale; P.M. NbE. hove to, ..	11 49	83. 35	..	..	..	{ At 10-15 on her beam ends, wind veered between Noon and Midnight to NE. but time not marked.
	Stalkart,	A. M. Hard gales NNE. in- creasing 10 P.M. Hurricane NNW. ..	11 33	80. 58	..	..	..
	MADRAS and Roads,	Strong breeze from North, in- creasing to Midnight. ....	..	..	..	..	..	Heavy swell from NE.

Date.	Names of Place and Ship.	Winds and Weather.	Lat. N.	Lon. E.	Barometer.	Ther.	Simp.	Remarks.
24th Oct. 1842.	Brig Waterloo,	Fine,	14 44	86 38	..	..
	Lady Feversham,	Moderate with squalls,	13 16	86 15	..	..
	Ann Metcalfe,	Decreasing from Midnight. Noon moderate,	12 6	84 30	4 A.M. 29.20 8 — 29.50	..		
	London,	Veering to SE., moderating at Noon, P. M. ESE.	12 34	83 44	29.70 29.50	81		
	Sarah,	Veering; NEbE. to EbS. At Noon strong gales, P.M. SSE.	13 34	83 53	4 A.M. 29.63 8 — 29.73			
	Favorite,	Daylight SE. Noon moderat- ing, P.M. SEbS.	11 53	83 35	..			
	Stalkart,	6 A.M. West furious gale, 10 P. M. strong gales South. Midnight fine,	11 33	81 31	..			
	MADRAS,	At Night smart squalls. 8 A. M. NNW. gale thick and heavy. Noon Wind N. to Nbe. 2 P. M. NNE. and NNE. to ENE.; at 6.7. EbS. and ESE.; at 8. SE. 10 clear- ing up, .. . . .	..	..	8 A.M. 10 — Noon 29.78 2 P.M. 29.72 9 — 29.84	..		Mostly slipped at 9 to noon and stood out East; 3, stood to the SE.
	Ships putting to Sea from Madras Roads, .. . . .	.. . . .	..	..	..	..	..

Note.—The object of this Table being to trace the track of the storm I have not given here (for they offer little or no data for that purpose) the ships which slipped between 8 A. M. and Noon from Madras Roads, which being all in the Northern half of the storm, had all the wind veering gradually from North or NbW. in the Roads to SE. in the offing, and none of them being far enough to the South to meet with the centre. The wrecked ships were partly I think drifted on shore for want of canvas, and partly by the storm wave or storm current, to which I shall refer in the remarks at the conclusion.

Date.	Names of Place or Ship.	Winds and Weather.	Lat. N.	Lon. E.	Barometer.	Therm.	Remarks.
24th Oct. 1842.	Lady Clifford off Na- gore to Sadras,	Gale from the Westward and WSW.	° ' / Noon 11 9 Midt. 12 20	° ' / 80 10 80 55	Noon 30.60	..	{ Bar. from 29.90 to 30.00: at Noon 29.70; at 5 P.M. and 29.90 at Midnight. Pro- bably too high.
	Pondicherry,	10 A.M. N.W. to W.N.W. squalls, 4 P.M. violent Hurricane, 5 P.M. N.W. to W.N.W. and calm when renewed from S.W. to South, at 9 P.M. S.E.	11 59	..	..	..	Bar. rose on the morning of the 24th.
	Porto Novo,	Fresh gales N.W. 6 P.M. shifted to S.W. at Midnight South.	11 31				

Summary.

It is evident enough, that this storm was one coming in upon the Coromandel coast from the Eastward and it will be observed by our charts, that we have secured, through Captain Biden's zealous assistance, a chain of vessels, (which almost appear as if *stationed* there) from the Andamans to Madras ; every one of which experienced the commencement of the storm before it terminated with the vessel to the Eastward of her ; and every one of which had the winds and shifts of wind exactly as they *should* have them upon the supposition of a great whirlwind, rotating from left to right, or by S. E., N. W.* and moving at the same time forward, *and these winds, and shifts of wind, and successive storms can be explained by no other theory !* If the Law of Storms for the Northern hemisphere was yet to be demonstrated, it could scarcely be so more completely than it has here been : I begin of course with the vessel farthest to the Eastward.

This is the *Waterloo*, which on the 20th October at noon was passing the Southern extremity of the Andamans with fine weather, and from thence steering to the N. W., with fresh N. N. E. breezes. On the 22nd October, we find her at noon in lat. 13° 27' N. and long. 90° 03' E., being then three degrees to the Westward of the Andamans, and ten degrees to the East of Madras, with heavy gales from the N. E. which had increased from the midnight preceding ; and by midnight of 22nd to 23rd, when she had made about a degree to the Northward and Westward ; and when the storm, if it then existed as a circular one, had also travelled to the Westward: the wind was at Eastward moderating. We have no Barometer marked, but this change is that which a rotatory storm would give, and which a mere monsoon gale would scarcely do. I take it therefore, that at noon on the 22nd, the centre of this storm was about 120 miles to the S. E. of the *Waterloo's* position. I have carried the line marking the track from the direction of the Andamans, and if we take the increasing breeze of the 21st to have been part of the storm, the centre will for that day fall to the Eastward of these Islands ; but we have too little authority I think, to assign it any place for the 21st.

* This is Professor Dove's description of the rotation, and as it is better than ours I use it here, and shall use it in future.

On the 23rd, the *Waterloo* had fine weather, having stood to the N. W., and the wind at noon South and S. Easterly, being altogether out of the reach of the storm; another proof also, that her gale of the preceding day was part of a rotatory, and not a monsoon gale.

The *Lady Feversham*, which is the next ship to the *Waterloo*, was at midnight on the 22d-23rd about 220 miles to the S. W. by W. of her, and about on the latitude of the track of the storm; she had the wind increasing so rapidly from the North and N. by W. from noon to that time, that at 11 p. m. 22nd, it was blowing a gale, and at 1.30 a. m. of 23rd, a complete hurricane, so that she was just enveloped in the hurricane when it had entirely left the *Waterloo*. At 1.45 a. m. of the 23rd she was dismasted, and at 2.45, the calm centre reached her. At 3.30, the hurricane is stated to be with her at its greatest force; her Barometer being at 28.30, from which time it moderated, till at noon it is called a strong wind at E. S. E.

The *Ann Metcalfe* is the next vessel, and with her it is not called a hurricane till 8 a. m., or about 8 hours later than with the *Lady Feversham*: and with the *Metcalfe* the calm took place at noon, giving thus pretty nearly the centre for noon that day, which also agrees with the log of the *London*, which had "a strong gale" at N. N. E. at this time, and generally with those of the *Favorite*, *Sarah*, and *Stalkart*.

These data are all good for the centre of the storm for the 23rd in about lat. 12° N. long. $85^{\circ} 30'$ E. which is also given (evidently in such weather an estimated one) as the position of the *Ann Metcalfe* at noon.

There are, in adopting it as the centre, two slight discrepancies to be noticed; the first, that though it is only 45 miles to the Westward of the *Feversham's* position, that vessel at noon had the weather moderating fast, and wind from E. S. E.; the second, that the direction of the wind with the *Favorite* (N. N. E.) if her position is right, would place the centre further to the Southward, and the last, that though almost fine with the *Feversham*, it was beginning to be felt as a gale by the *Sarah*, which was at 145 miles of distance from this centre.

We cannot, however, take upon ourselves to alter the estimate of a vessel's position, though the storm wave and storm currents must have carried some of the vessels much beyond or within their estimated

drifts. It is probable, that as the *Feversham* had no observation, she may have been in error.* The whole difference which these considerations make is not much, but I note them to shew that nothing is overlooked. Are they to be accounted for by the theory that the progressive motion of a rotatory storm, particularly when as in this case it is a rapidly moving one (12 or 13 miles an hour) tends to generate the rotatory motion farther before it? We know so little of how they act, that this supposition is at least worth mentioning. Most accounts of storms seem to agree in this, that the force of storms and the rise of the Barometer are greater and more rapid than their increase or its fall. I have marked on the chart, the spot where the *Washington* foundered on the 25th. As she had the hurricane from the Eastward, she was to the Northward of its track, and must have drifted up after it was over with the S. Easterly winds, which we see the *Lady Feversham* had, and which indeed seem usually to follow the N. E. quadrants of the storms, and sometimes their S. E. quadrants also. The ship seen by the *Washington* was probably the *Lady Feversham*, which had only a foremast left standing, though this last vessel's log does not mention any other vessel in sight; but when all hands are busy rigging jury masts and pumping, the look out is rarely attended to. The *Washington* in her sinking state, was no doubt most anxiously looking for ships.

We have now to consider the probable place of the centre at Noon on the 24th, which day it will be recollected is that of the storm's reaching Madras and Pondicherry. At Madras the veering of the wind N. N. E. by N. E. and East to S. E., with fine weather, shews clearly enough, that the centre passed to the South of that place, while the veering of the wind at Pondicherry from N. W. by the West to S. W., shews also, that it passed close to the Northward of that settlement; the short calm interval noted in the reports being the time of the passage of the centre. This is stated to have been at 20 minutes past 5.†

* See concluding remarks.

† The lowest depression of the Barometer at Madras is stated to have been at 4 P. M. 29.704; it seems to have been 4.45, P. M. before the wind was at East, but as I have already explained before, the direction of the wind varies much on approaching the land.

Now from Noon 23rd to half-past 5 of the 24th is $29\frac{1}{2}$ hours, and the distance between the place of the centre on the 23rd and Pondicherry is 385 miles, which divided by $29\frac{1}{2}$, gives about 12.4 miles per hour. In the $5\frac{1}{2}$ hours from Noon, the centre would at this rate have made 68.2 miles, which gives the distance of the centre, bearing about West from Pondicherry at Noon on the 24th or in lat. $12^{\circ} 2' N.$ long. $81^{\circ} E.$

We have now to trace the storm inland, and for this purpose our materials are the letters and reports from Ryacottah, Bangalore, Bellary, Salem, Madura, Paumban, &c., and from Cochin and Telli-chery, on the Western coast. For these we are indebted to Capt. Campbell, of the Revenue Survey; to Capt. Newbold, Assistant Commissioner of Kurnool, whose able remarks I have placed in the Summary; to Mr. Crozier, Sub-collector of Madura; Mr. Bruin, Magistrate of Mangalore, and Mr. Bourgoïn, Governor of Mahé, and my readers will now please to refer to Chart. II. Ryacottah is in Lat. $12^{\circ} 31\frac{1}{2}' N.$ Long. $78^{\circ} 5' E.$, and its bearing and distance from our centre of the 24th is about W. b. N. 184 miles, and we find that by 4 P. M. of the 24th it was blowing strong at North. By 9, it was blowing in doors and windows, so that we may take it fairly to have begun as a gale at North at 6 P. M. on the 24th; and as by $3\frac{1}{2}$ A. M. on the 25th, the wind was at East with the Barometer at 29.636, its lowest depression, we may assume that the centre was now on or near the meridian of this place, at say 60 or 80 miles distance; for we see by Capt. Newbold's letter, that it was felt severely at Salem from the N. E. (time not mentioned,) which shews that its centre, taking it to be then a circular storm, was yet to the South of that station, and that it was *not* felt at Madura, 104 miles South of Salem, or 154 of Ryacottah. In estimating the position of it, we may take this spot to be also at the same distance from our centre of the 24th (already laid down) as Ryacottah itself, or 184 miles, or about in the latitude of Porto Novo; so that we have the storm travelling from Noon 24th to $3\frac{1}{2}$ A. M. on the 25th, or in $15\frac{1}{2}$ hours, 184 miles, or 11.9 per hour, our former rates being 12.4 miles per hour, a less retardative rate than we have hitherto found in former storms.

* Salem is about 50 miles S. by E. of Ryacottah.

Taking this rate, we may carry it farther on from $3\frac{1}{2}$ A. M. to Noon of the 25th May, which will give us, taking it to have passed on a nearly W. S. W. course, but curving as it passed Pondicherry, so as to form an arc, $8\frac{1}{2}$ hours at 11.9 per hour, or about 100 miles beyond the meridian of Ryacottah, if it still moved at the same rate, though of this we are not certain. This calculation would place the centre at Noon 25th in lat. about $10^{\circ} 30'$ long. $77^{\circ} 00'$ E. or about the head of the Paulgatcherry Pass on its South side, as supposed by Captain Newbold in the extract which follows in the next page.

We next find that according to the extract from the Bombay paper, the *Seaforth*, Ceylon steamer, encountered the storm at 10 P. M. on the 25th off Cochin. I have only this brief notice of this vessel's log, and thus we cannot say if she encountered its Northern or Southern half, or its centre; but as the track of the storm certainly trends to the N. Westward in the Arabian sea, as we shall see by the subsequent logs of the *Lucy Wright*, *Futtay Salam*, &c. we may say that it was in all probability the centre or the Southern half of the vortex, which the *Seaforth* met with. If we take her to have been 60 miles from the coast, which in the dangerous month of October is not an excessive offing, this would give, from our centre before mentioned a distance of 110 miles in 10 hours, or 11 miles an hour, or nearly its former rate. It must be recollected, that if the *Seaforth* might have been much closer in shore, the storm also might have been much retarded by the steep escarpments of the pass; and all we wish to shew is, that there is connection enough between its rates of travelling, and the times at which it was felt in various places, to enable us to pronounce, on fair and reasonable, if not on positive grounds, that it was *the same* storm throughout.

Before tracking it farther at sea, I shall give here Capt. Newbold's highly interesting views as to the passage of the storm over the peninsula.

“ From the physical configuration of the country to the North, West, and South of Madras, it strikes me that any aerial current coming from the Eastward, would be directed from its progress in a direct Westerly direction by the high line of the Eastern Ghauts, and turned in a South-Westerly direction by the break of Salem, whence sweeping across the plains of Coimbatore at the Southern base of the *Koonda* and *Nilgherry* escarpments, it would be concentrated on that singular gap

in the Western Ghauts—the Paulghautcherry pass, whence it would make its escape Westerly to the Indian Ocean in the direct latitude of the Laccadives. I enclose you a small map, of which I beg your acceptance, on which I have marked by arrows, the probable direction of the Madras storm,* which if it be the identical one that visited the Laccadives, must have pursued this course, and have been felt at Arcot, Vellore, Salem, Darapooram, Coimbatore, Paulghautcherry and Paniani, on the Western coast, the appropriate situation of which I have marked in ink on the map. It will be also seen, that currents of air, blowing Easterly across the peninsula about the latitude of Madura, and winds blowing Westerly about the latitude of Cochin or Alleppie, must be diverted Southerly by the Western Ghaut ridge to Cape Comorin, a circumstance which may account for the gusts experienced off this Cape during *both* monsoons. Winds blowing from the W. in the latitude of Paniani and N. of it, Calicut, Tellicherry, and Cannanore perhaps, would be deflected by the Ghaut barrier Southerly, in the direction of the arrows on the map marked B. to the great gap of Paulghautcherry, and thence rush through it Easterly on the plains of Coimbatore and Salem.

“ The exact points where the winds are thus deflected, their minute variations of current, with their various minor influencing causes, are still matters of interesting research and a meteorological desideratum: but that they are deflected as I have described on the grand scale by the Ghaut lines of elevation which constitute the main features of the physical contour of Southern India, there can be little doubt. It is a well known fact, that where these ridges attain a certain height, neither the North-East nor South-West Monsoons usually ascend above them. I was crossing the Eastern Ghauts at the time of the storm at Madras a little S. of the latitude of Nellore, and observed an enormous mass of irregular clouds rise from the Eastward, and advance rapidly on the mountain; here the great bulk was arrested, and (collected by electric attraction?) into a long, horizontal, wall-like bank, of solid aspect and of a deep bluish hue, varied at the edges by flocculent curves and zones of sombre grey, which appeared in vivid distinctness, as ever and anon coruscations of lightning shot up and illumined portions of the gloomy mass. In height and contour, they assimilated the mural barrier opposed to them. They remained in this sullen form apparently motionless for a day or two, when they gradually dispersed. There was little wind in the sheltered valley along which I travelled, and that little variable. A few detached higher clouds escaped and passed slowly to the Westward, while portions of the upper edge of the cloudbank would sometimes curl over the top of the ridge, like the falling crest of a wave dispersing in spray, and descend in a transient shower on the Western slopes. An almost similar phenomenon is presented on the table lands on the

* I have copied in my Chart No. II, as much of the chain of Mountains as relates to our present subject.

West flanks of the Eastern Ghauts on the commencement of the N. E. Monsoon.*

“The almost effectual barrier presented by the Eastern Ghauts to the force of the N. E. monsoon is a proof, that this great aerial current is confined, generally speaking, to the lower strata of the atmosphere. The same may be perhaps said of the Madras storms, which generally travel from the East. Though often *commencing* from the N. and N. W., the current from the East first striking the Ghaut line to the N. of Madras, that city thus receives this deflected Southernly current previous to the arrival directly of the main body from the East. The foregoing remark, of course, you must apply with much modification to the *true whirlwind storm*, which owes its vortical movement to far different causes. The *average* height of the Eastern Ghauts N. of Madras is about 1,500 feet.

“Places situate on the table lands *East* of the *Western* Ghauts experience still less of the S. W. Monsoon (the heavier of the two,) than the tracts sheltered by the Eastern Ghauts from the N. E. Monsoon. This is ascribable to the greater *average height* of the former, (3,000 feet above the sea,) and to their more continuous character as a mountain chain. The almost only exception to this remark arises from a remarkable opening in them; viz. the gap of Paulghautchery, which I have already alluded to as the probable route by which the Madras storm found its way across the peninsula to the Laccadives. It may be as well here to state in corroboration of this supposition, that it is well known (Madras Almanac 1840) that ships navigating the Malabar coast during the *N. E.* Monsoon, commonly experience a stronger gale in the neighbourhood of Paniani than elsewhere; and this break in the Ghauts appears to be the cause of this effect.†

“During the S. W. Monsoon, the Westerly wind, which sweeps through this pass from the beginning of June until about September, is extremely violent at Darapooram and other places to the Eastward in a line with its longitudinal axis, as its influence is felt even farther East than Trichinopoly; but at other places a little N. or S. of the line of the pass, the current is hardly perceived. The pass is from 16 to 20 feet wide, narrower at the E. than at the W. extremity: lofty rocks of the Koondah and Nilgherry chains on its Northern, and the Palghaut groups on its South flank—its surface is pretty level; the slope from the plains of Coimbatore to those on the coast so gradual as to be almost imperceptible; the height of the pass above the sea about the centre (roughly approximated by means of the boiling point of water) is 900 feet.

“I will write to Salem for such information as I can procure.”

* We are forcibly reminded here of the Devil's Table Cloth preceding a S. E. gale in Table Bay.—H. P.

† This is confirmed by Horsburgh, and the experience of all navigators in that sea

The foregoing views it will be seen, by those who have followed the series of these memoirs, are exactly analogous to those advanced in my first memoir, where I have given a chart illustrative of the deflection of the S. W. Monsoon, by the mountains on the coast of Arracan, from Cape Negrais Northwards, by the Cachar and Bootan ranges, till, by those of the Himalaya, the S. W. Monsoon for a part of its duration is converted into a stream of Easterly winds. There can also be little doubt, that as Capt. Newbold remarks, the winds and hurricanes rarely extend to any great perpendicular height, and are thus constantly subjected to all the deflections and interruptions which hill and mountain ranges occasion.

We have now, having I think, shewn satisfactorily that the storm was identically the same with that of Madras (?) to follow it in its course in the Arabian Sea; and our next document is, (not neglecting to note the fall of the Barometer at Bombay, from the 25th to the 29th as we proceed,) the notice of the dismasting of the *Lucy Wright*.

This vessel was on the 27th, when the height of the storm occurred with her, in lat. $13^{\circ} 2' N.$ long. $71^{\circ} 39' E.$ This spot is distant 340 miles from that at which we have placed (by estimation only) the centre of the storm on the 25th at Noon at the head of the Paulghautcherry Pass, and we know that while it was raging at sea with the *Seaforth* ten hours later, it was not felt, though there were clear indications of it, to the experienced native craft and fishermen, and these would doubtless have been much more distinct with the assistance of a Barometer and Sympiesometer, at Tellicherry and Mount Dilly, 100 miles to the North of the *Seaforth's* position. Our reports from Mahé and Karical also confirm this; but again at Mangalore we find on the 25th, strong gusts of wind from the N. W., as if there was then a commencement of a storm hereabouts, the original one having separated into two by the various obstacles it met with. It is, however, just possible, that these N. W. gusts were nothing but parts of the storm pouring over the Western Ghauts. The *Higginson*, 75 miles West of the *Lucy Wright*, had a heavy gale for 6 hours from West to South on the 28th, and must have been therefore in the S. E. quadrant of it; the centre being thus to the N. W. of her, and having passed nearest to her, and to the Northward, at 6 A. M. of the 28th,

as would appear by the fall of her Barometer. We do not know how the *Lucy Wright* had the wind, so that we must take the *Higginson's* datum as the nearest and most detailed, and *her* account, with what we have already remarked of the limited extent of the storm off Cochin with the *Seaforth*, which excludes the supposition of these storms being the same, may allow us to assume, for we can do no more, that at 6 A. M. on the 28th, the centre of a storm was, say 40 miles or less to the North of her, and that her Easterly and N. Easterly drift with a Westerly and South-Westerly gale brought the wind to South, which it might quickly do when on such a small circle.

We know only of the *Lucy Wright*, that she was dismasted the day preceding, but in what part of the storm, or where she may have drifted to by this time, 6 A. M. 28th, we are quite ignorant. I have therefore not marked any circle for her on the 27th,* and though it is certain that, as we shall presently see there were two storms, we do not know their tracks hereabouts.

But we now find by the *Futtay Salam's* log and track, that she had been running to the N. by E. from about lat. 8° to lat. 12°, and between 68° and 69° E. till midnight of the 26th, when she evidently plunged into the circle of a storm on its S. E. quadrant, as she had then a gale from S. W. which increased to a hurricane from S. S. W., South, and S. East, moderating again a little by midnight of the 27th-28th; so that she may be taken, from midnight of the 26th to midnight of the 27th, or for 24 hours, to have been drifting, and pretty close to the centre, across the S. E. quadrant of a storm, of which the centre was of course brought successively to the N. W., West, and S. W. of her, as it progressed and the vessel drifted.

Now if we consider this with the chart and log before us, we may fairly allow, that at Noon of the 27th, the centre of the *Futtay Salam's* hurricane bore from her about West, 30 or 40 miles, or was in lat. 12° 00' N. lon. 68° 20' or 30° E., and I have from that point struck a circle to shew it. This circle will also shew, *that this storm and the*

* There is a considerable degree of uncertainty about all newspaper extracts relating to storms, on account of the errors with which, even in the best printed ones, these accounts always abound. Mr. Redfield I think alludes to the same circumstance, as much diminishing the value of newspaper notices.

Higginson's could not have been the same, for the *Higginson* being bound to Bombay, must have been on the 27th, (unless she lost ground between that and the 28th,) somewhere to the Eastward of her position on the 28th, which would place her on, or not far from the meridian of the *Futtay Salam's* storm, where she would first have had the wind from N. E. East or S. E., being in its Northern half; whereas she had it "from West to South," or was in its *S. Eastern* quadrant like the *Futtay Salam* on the 26th; and if on the 27th at Noon, the *Futtay Salam's* hurricane be supposed to reach to the *Lucy Wright's* position, and have been there violent enough to dismast her, (at a distance of 180 miles from its centre,) which is very improbable, this would *a fortiori* have given the *Higginson* an Easterly or E. S. Easterly hurricane on the 27th; when it is apparent that she had fine weather; for it was evidently not then even threatening enough to be mentioned in her log. She was, as I before said, bound to Bombay, and must therefore have been coming from some point between S. and N. W., and this would always have given her bad weather from some quarter on the 27th, as would also any track we can suppose for the storm. Hence it is clear, that the *Futtay Salam's* hurricane and the *Higginson's* storms could not be the same; as the *Lucy Wright's* and *Higginson's* might have been so, the one being dismasted on the 27th, and the other meeting a storm as she came from the Eastward on the 28th. In the absence of further information then, I suppose that there were here, as we have found before where the track of a storm crosses, or makes a considerable angle with the prevailing Monsoon, two storms.* Of these I take the *Lucy Wright's* and *Higginson's* to have been the smaller one, and the *Futtay Salam's* and *Seaton's*, which we must now consider, to have been the greater and more direct one.

The *Seaton's* storm it is clear from the shift of wind was a severe hurricane travelling from the E. by S, or E. E. S. to the W. N. Westward. I have marked the Lat. and Long. at which it first struck her, and that to which she might have drifted between, say 6 A. M. on the 31st and 6 A. M. on the 1st with a N. N. Westerly gale, drifting

* The probability of two storms is much increased, as far at least as mere dynamical forces and interruptions go, by considering how many currents our storm must have created in its passage over the Ghauts, and the interval of threatening weather only along the coast under the line of the Ghauts.

before it at the rate of $3\frac{1}{2}$ miles per hour, the least which we can allow for a disabled ship. This brings her to lat. $12^{\circ} 36'$, long. $60^{\circ} 38' E.$ as the spot where the centre passed her.

We have from this point then, which is tolerably well ascertained, and which the storm reached at 8 A. M. on the 1st November, the following data in time and distance.

	Distance.		Time.	
	miles.	days.	hours.	
To the centre of the <i>Futtay Salam's</i> hurricane, Noon 27th October,	480	4	18	or 114 h. or 4.2 per h.
To the centre of the 25th at Noon, near the Palghautcherry Pass,	990	6	18	or 162 h. or 6.1 per h.
To the centre of the 24th to the Eastward of Madras.	1230	7	18	or 186 h. or 6.6 per h.

The mean of this is 5.6 per hour, or only one-half of what we allowed it to have in crossing the peninsula, and less than half of what we have proved it to have had in the Bay of Bengal; but then we must not forget, first, that it had to force its way over the peninsula, and through 900 miles of distance in the Arabian Sea against the S. W. Monsoon; next that these sort of calculations and allowances always assume some initial force or rate of motion; and lastly, that we know absolutely nothing at all of the *cause* either of the rotatory or progressive forces, or of their opposing resistances and retardation, or if they acquire, or have under any, or what, circumstances, the power of increasing the velocity of either of their motions.

Of all these things, and of much more which will readily occur to men of science, we are profoundly ignorant, and as I have before said, all we can now do is to register accurately, and deduce—when we must deduce—doubtingly.

The log of the *Chieftain* is the only one which now remains for us to remark upon, and it will be evident that she was on the 2nd November just far enough within the verge of the vortex to feel the sea, and have the threatening appearances with the wind veering as it would

do on the southern half of a storm, as the vortex passed on ahead, and to the Northward of her. Her position when compared with that of the *Seaton* at 6 A. M. on the 1st, shews that the track of the storm was now tending to the N. W., and we find accordingly by Dr. Malcolmson's account, that it was severely felt on the Arabian Coast, and that there were some indications of a storm at Aden. We cannot, however, upon such vague accounts, pretend to track it any farther. I grieve to add that ; to the disgrace of those who may deserve the blame ; neither the log of the *Cleopatra* or of the *Semiramis*, both Government steamers, have been obtainable ; I have strong suspicions that both ran headlong into the storm circles. Is the Government of Bombay aware that a mistake of this kind might cost it a steamer, or at least half of a lac of rupees of damages ?

Conclusion.

I mention with some satisfaction here, not only that this is the first storm which we have tracked in what must soon be the great highway between England and India, the Arabian Sea, but also that we again find confirmed the law which my previous researches have shewn to hold good for the China Sea and Bay of Bengal, *i. e.* that the storms always come from the Eastward, and travel to the Westward, and it is gratifying to have now ascertained this, with some trifling intervals over 60 degrees of longitude, or one-sixth of the circumference of the globe. As public attention is gradually drawn to this important subject, we may hope that, ere long we shall at least be able to trace the storms of this great, and to us most important division of the Ocean, with as much accuracy as those of other parts of the Eastern Seas.

I must not omit also to point out an important practical lesson for the navigator on the Coromandel Coast, which should not be omitted, and it is this. Those who have studied this subject, and are acquainted with the publications of Reid and Redfield relative to the storms of the Western hemisphere, and with my own relative to those of the Eastern hemisphere, are well aware of the abundant evidence which exists (and there is much more yet unpublished,) to prove the existence of "storm waves" and "storm currents."

To those, however, who are not fully acquainted with the subject, I may say, that the "storm wave" is a mass of water of greater or less diameter according to the storm, raised above the usual level of the ocean by the diminished atmospheric pressure and perhaps other causes, and driven bodily along with the storm or before it, and when it reaches bays or river mouths, or other confined situations, causing by its further rise when contracting, dreadful inundations; but upon open coasts rarely so, or not in so great a degree, as it can there spread out quickly and find its level.* The "storm current" may be briefly described as circular streams on the circumferences of rotatory storms, and of this also we have evidence enough for the mariner at all times to admit, and be on his guard against the *possibility of*, or even the *great probability of*, them.

We have thus in every storm two sets of forces (currents) independent of that of the wind, acting upon a ship; the one carrying her bodily onward on the track of the storm, and the other drifting her round the periphery of that part of the storm circle in which she may be.

Taking, as the simplest case, and one nearly that of Madras Roads, a storm travelling from East to West, and striking upon a Coast running North and South, its centre passing over Pondicherry, we should have then, for all ships in the offing, one current, "the storm wave" carrying them directly on shore, with greater or less velocity, as they were nearer or farther from the centre; and other currents, "the storm currents" varying in their direction according to the situation of each ship in the storm circle, but always agreeing pretty nearly with the direction of the wind.

The current of the storm *wave* then is setting due West, but that of the storm *current* West on the North side of the storm circle, and due *East* at its South side; South at its Western edge, and North at its Eastern side, and so on in all the intermediate directions; and a ship putting to sea from Madras roads in our supposed case, will be carried right towards the shore by the *storm wave*, and to the S. Westward also by the *storm current*; but if putting to sea from

* The deep sea wave also, (the *flot de fond* of the French writers) no doubt assists the inundation; but as this is not a surface cause, I do not allude to it.

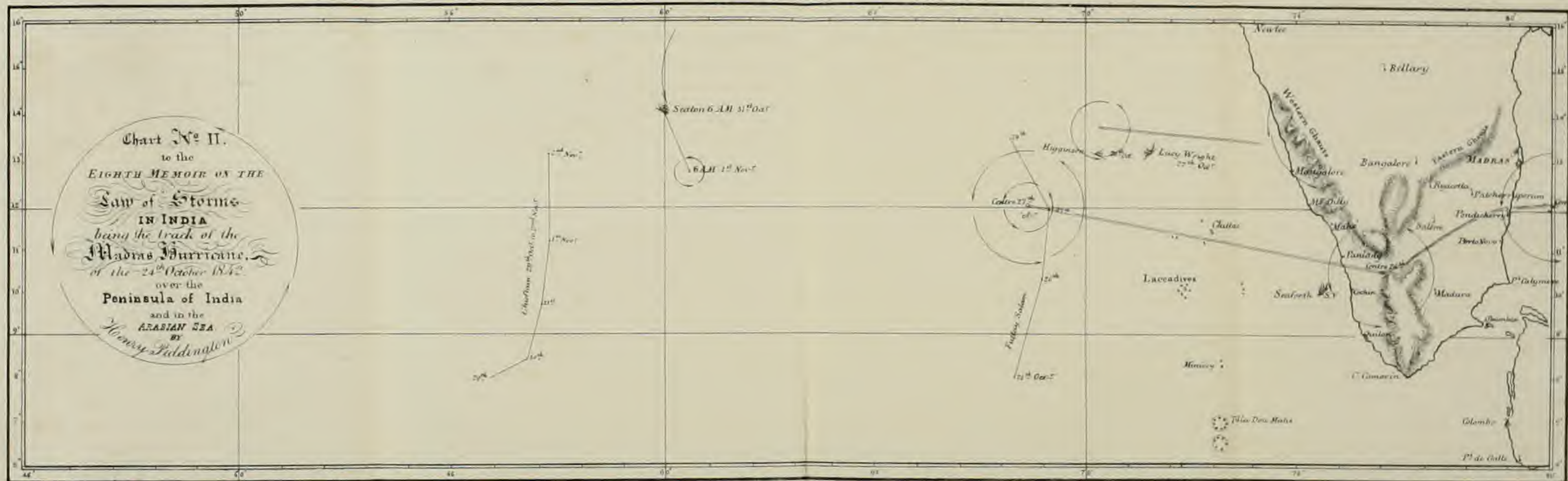


Chart No. II.
to the
EIGHTH MEMOIR ON THE
Law of Storms
IN INDIA
being the track of the
Madras Hurricane
of the 24th October 1842
over the
Peninsula of India
and in the
ARABIAN SEA
BY
Henry Piddington

Back Sheet 1 and 2 are 3 1/2 x 5 1/2 inches

H.M. Smith

the inundation; but as this is not a surface cause, I do not allude to it.

any place to the Southward of Pondicherry, she would be carried one way by the storm wave, and the opposite one, or partly so, say to the S. E., East, or N. E.: by the storm current; so that as to mere Westing, the effect of the one would probably neutralise that of the other. The case of ships on the Northern half of the storm, where both forces are against him, should however be borne seriously in mind by the seaman. It was probably the cause of the indraught which wrecked the ships which were lost in this storm, and of some of the others finding themselves in much shoaler water than from their run, they might reasonably have supposed. Captain Biden's suggestion in the port orders, to keep a due attention to the lead in these cases is then founded not only on merely sound nautical experience, but upon good scientific grounds also. To neglect the lead is a positive act of barratry or folly, for in these storms it is impossible to estimate the true distance from the coast by any other means, and the three forces, the "storm wave," "storm current," and the drift occasioned by the wind, would form a complex problem in fine weather. The seaman will not fail to recollect how much influence the storm wave may have upon his position in places where, as in the British Channel,* a storm coming from the Westward, brings with it a vast mass of water from a great Ocean like the Atlantic, so that with a Southerly or South-westerly gale, he finds himself set far to the Eastward by some hitherto unknown but fatal current: and I trust that when I say that, if we can obtain documents, we may trace out accurately the laws of these dangerous complications, I shall add another claim to the assistance of every right minded seaman, and of every friend to humanity.

* I allude here, it will be perceived, to the two recent and harrowing catastrophes of the *Reliance* and *Conqueror*. In both these cases the gale being Westerly, the vessels were on the Southern half of the storm circle, and had thus both the storm wave and storm current carrying them far to the Eastward of their reckoning.

Translation of the Naipáliya Devata Kalyána, with Notes. By B. H. HODGSON, Esq. Resident at Kathmandoo.

1. May the first born, the holy Swayambhu, Amitaruchi, Amágha, Akshobhya, the splendid Vairo Chana, Manibhava, and the supreme spiritual preceptor Vajra Satwa preserve us in all our journeyings and in all our abidings : May Prajna, Vajradhátwi, the all-bountiful Arya Tárà, and the rest be propitious to us. I adore them.

I. Fully to explain the substance of the stanzas comprised in this little manual, would require a comment ten times as large as the text : I must therefore content myself with simply announcing a few of the general principles of Buddhism, which may serve to connect the sense of the stanzas, leaving the exposition and proof of those principles to a future occasion, if not, to more competent ability. Buddhism, as it is to be found not only in the recent writings and present practise, but also in the very ancient Bouddha scriptures of Nipal, recognises a theistic, as well as an atheistic, system of the universe. According to the former, from an eternal, infinite and immaterial Adi Buddha proceeded, divinely and not generatively, five lesser Buddhas, who are considered the immediate sources (Adi Buddha being the ultimate source) of the five elements of matter, and of the five organs and five faculties of sensation. The moulding of these materials into the shape of an actual world is not, however, the business of the five Buddhas, but is devolved by them upon lesser emanations from themselves denominated Bodhisatwas, who are thus the tertiary and active agents of the creation and government of the world, by virtue of powers derived, immediately from the five Buddhas, ultimately from the one supreme Buddha. This system of five Buddhas provides for the origin of the material world, and for that of immaterial existences, a sixth Buddha is declared to have emanated divinely from Adi Buddha, and to this sixth Buddha, (Vajra Satwa by name,) is assigned the immediate originization of mind, and its powers of thought and feeling. The five, as well as the six Buddhas, are constantly invoked collectively under the names of the Paneha and Shata, Buddha and Ratna. All these Buddhas are often styled Ripopadaka, Manasi and Dhyani, titles which would seem necessarily to distinguish them, not only from the mere mortal Buddhas of the Swobhavika sect, but also from *any* generatively produced beings. Nevertheless in the first stanza of this manual (no very good authority) a sakti or spouse is assigned not only to each of the five Buddhas, but also to Adi Buddha himself : and I suppose therefore that with respect to these Bouddha goddesses of the Aishwarik, as we must adopt the fantastic theory of the Vedantika Brahmanists, and consider them mere nominal deities ; until we can assert (as I think we shall soon be able to do) that the theory of Sakties is a modern corruption of Buddhism derived from Brahmanism. I am aware that the Swobhavika Saugatats typify the innate powers of matter by a Goddess, but this is a notion totally different from the assignation of a female medium of activity to creators working declaredly by volitions, or (as the Bouddhas phrase it) by Dhyánas : and such is the statement which I have found in respect to the "Pancha Buddha" of the Aishwarikas in works of higher

authority than the Kalyána. But to return to my text, from which I have unwittingly too far deviated; the invocation of the first stanza is first, to the supreme Buddha, next to the six Buddhas, (whose more familiar names will be found below,) then to the Sakti of Adi Buddha, and lastly to the Sakties of each of the six Buddhas. The names of these ladies are as follow: Adi Buddha's Prajna, Vairo Chana's Vajradhatweswari, Akshobhya's Lochana, Ratna Sambhava's Màmukhi, Amitabha's Pandara, Amogha Siddha's Tárà, Vajra Satwa's Vajrasatwatmika.

2. May the Goddesses Sampatprodâ, Ganapatihridayâ, Vajravidrávini, Ushnishâ, Parna, Kitivaravadana, Grahamátrikâ, Kotilákshi, and the Pancharakshâ be propitious to us. I adore them.

2. The distinction of Swobhavika and Aishwarika Buddhists has already been alluded to. There is another division into exoteric and esoteric doctrines. The goddesses invoked in this stanza belong to the esoteric system, and to the Swobhavika school: for they are all said to have been produced from Swobhava "each with her own Vija Mantra." It may be proper here to observe that the Swobhavikas do not deny intelligence, but immaterial entity. They insist that those powers which others say were impressed on nature by the God who created nature are proper to matter itself which alone is; and which is eternal, not in its palpable individual forms, but in its impressable elements. They add that nature produces not only man but superior beings, (though none with such a plenitude of power as man is *capable* of attaining,) and amongst these beings are the goddesses invoked in this stanza. The more familiar, and (as it were) *proper* name of Sampatproda is Vasundhara, of Kitivaravadana is Marichi, of Kotilakshi is Pratingira, and the names of the five Rakshas are Pratesara, Máhasahasrapramurdini, Máha Mayari, Maha Setavati and Máha Mantranusarini.

3. May Ratna Garbha, Dípánkara, the Jina Manikusama, Vipasyi, Sikhi, Viswabhù, Kakutsat, Kanaka Muni, Kasyapa, and Sakya Sinha: may all the past, present and future Buddhas, whose excellence exceeds the bounds of the ten faculties be propitious to us. I adore them.

3. The objects of invocation in this stanza are ten Manushi Buddhas. The seven last are the famous "Sapta Buddha," and I doubt the propriety of associating any other to them. I am told that the Karana Pundarika assigns these 10 Buddhas to the four yugas, giving the three first named to the Satya, an idle story, or at least a legend contradicted by higher authority, such as that of the Sambhu Purana, which makes Vipasyi and Sikhi the Buddhas of the satya yuga.

4. May the first of the Bodhisatwas named Avalokeswara, may Maitreya, Anauta Ganja, Samantbhadra, Kshitijathara, Khagarbha, Sarvadyonevarakhya, Kulisvaradhara, and the great Manja Natha be propitious to us. I adore them.

4. Nine Bodhisatwas are invoked in this stanza, for all of whom the commentator claims a celestial origin and parentage, as follows :—

Aryavalokeswar,	..	..	..	Son of Amitabha.
Maitreya,	..	..	..	ditto ,, Vairo Chana.
Gagan Ganja,	..	..	..	ditto ,, Akshobhya.
Vajra Pani,	..	..	..	ditto ,, ditto.
Manja Natha, ..	..	..	..	ditto ,, ditto.
Samanta Bhadra,	..	..	..	ditto ,, Vairo Chana.
Kshiti garbha,	..	..	..	ditto ,, Ratna Sambhava.
Kha Garbha, ..	..	..	..	ditto ,, Amitabha.
Sarvani Varana Viskambhi,	..	..	..	ditto ,, Amogha.

In this enumeration the more familiar names of the Bodhisatwas are preferred to those of the text. This commentator was doubtless an Aishwarika Bauddha, and a recent one who, according to the prevalent modern fashion has resolutely assigned a heavenly origin to Bodhisatwas of mortal mould. The first (who is the same with Padma Páni,) fourth and sixth are notoriously celestial sons of the Divine Buddhas to whom they are assigned, but the others, and especially Manjnath, are doubtless of mortal origin, and historical personages.

5. May that light which, a proportion of himself, the supreme Buddha caused to issue from the lotus that sprang from the seed planted in Nagavasa by Vipasyi, and which, (light,) itself one, became five-fold in the five Buddhas for the preservation of mankind, be propitious to us. I adore it.

5. Here the object of invocation is to the Jyoti-rup-adi Buddha of Sambhu Nath mountain, a portion of the supreme Buddha revealed in Nipal in the form of flame. The legend is to be found in the Sambhu Puran, but is too long for insertion here. It is said by the Bouddhas of Nipal, that the ever-during flame still burns in the centre of the hemisphere of Sambhu Chaitya.

6. May that mysterious portion of Prajna, born of the lotus with three leaves in the form of Guhyeswari, made manifest by Manja Deva, void of form, the personification of desire, favourable to many, the giver of boons to her worshippers, praised by Brahma, Vishnu and Siva, revealed on the 9th day of the dark half of Marg in the fathomless waters (of Nagavasa), be propitious to us. I adore *her*. (Qy. *it* ?)

6. The Jal-surupa-Prajna of Nipal is here invoked, a portion of Prajna (the Sakti of Adi Buddha) in the form of water. This legend is a part of the foregoing, and is to be found in the Sambhu Puran. When Manja Nath had let off the waters, Jyoti-rup-Buddha was revealed: Manja resolved to raise a chaitya over the sacred flame, but when he essayed it, water bubbled up so strongly on the spot that he could not lay a single stone: perplexed, he resorted to prayer, when Guhyis-wari or Tal-rup-Prajna revealed herself for a moment; so immediately the water subsided, and Manja completed

the chaitya. I have translated "nairatmya" without form, and "agadhe" in fathomless *water*, in obedience to two comments, and to the opinion of a learned Buddha, to whom the words and meaning of these stanzas are as familiar as household terms.

7. May Ratna Singeswara, who was produced out of the union of a portion of Maitreya and of the light of the jewel of Manichura, who issued in the form of Srivatsa out of the riven rock on mount Manichur; whom the other seven Vitaragas reverence as their chief; and who is the raft by which the ocean of life may be crossed; be propitious to us all. I adore him.

7. In this and the seven following stanzas the eight Vitaragas of Nipal are invoked. Vitaraga is a portion of a Bodhisatwa, revealed under some non-human form.

In stanza 4, we have seen that there are nine famous Bodhisatwas. Of these the first, or Aryavalokeswara, never individuated a portion of himself, nor has he any manifestation but under a human form.

The individuated portions of the remaining Bodhisatwas are styled Vitaragas. Maitrègás is the first, under the name of Manisingeswar, and form of a waving flame called Srivatsa. The forms of the remaining Vitaragas are severally, a lotus, a flag, a kalas, a chowry, a fish, an umbrella, and a conch. Some say that the singa is also a form common to all the Vitaragas, whilst others insist that singa here applied to them means merely sign-symbol. The symbols of the eight Vitaragas are often called collectively the "eight mangalas." Manichura was a Raja of Saketa Nagar or Ayodhya, in the crown of whose head grew an inestimable jewel, which he offered to the gods to avert their wrath in a general calamity. The legends of the Vitaragas are to be found in the Sambhu Puran. They are too long to be inserted here.

8. May that portion of the Bodhisatwa Gaganganja, which at the command of Padmapani assumed the form of a lotus, in order to relieve the cruel Raja Gokarna after he (the Raja) had, in atonement for his sins, become a penitent and worshipper of Padmapani on the banks of the Vachmati, and which, as Gokarneswara Vitaraga, still remains at the confluence of the Vachmati and Amoghvati for the purpose of delivering the ancestors of those who pay their devotions there, be propitious to us all. I adore *it*. (Qy. *him*?)

8. Invocation to the second Vitaraga under the name of Gokarneswara. Gokarna was a Raja of Pancha Des in the East of Hindoostan, says the comment.

9. May the mighty Vitaraga named Kileswara, who is a portion of Samanta Bhadra, and who took the form of a flag in order to frighten the furious serpent Kulika, when he secured it with the flag-staff on

the mountain of Charugiri for the preservation of mankind, be propitious to us all. I adore him.

10. May Sarveswara Vitaraga, who is the portion of the Bodhisatwa Vajra Pani, left on earth, in the form of a kalas, for the preservation of mankind by that Deity when himself descended for the purpose of relieving the Vajra Acharya named Sarva Pada, be propitious to us all. I adore him.

11. May Gattesa Vitaraga, the form assumed by Manja Deva for a portion of himself in order to awaken the ignorant and idle and sensual Manja Gartho, and convert him into a profoundly learned sage, be propitious to us all. I adore him.

12. May Phanindreswara Vitaraga, the form assumed for a portion of himself by Sarvani Varana Viskambhi Bodhisatwa, that Bodhisatwa desirous of the form of a fish, the wearer of huge serpents as ornaments, and who, having fulfilled the desires of Oriya Acharya, took the form of a fish, be propitious to us. I adore him.

12. The address here (as in the other instances) is chiefly, if not solely, to the Vitaraga: yet it is hardly possible to give unity to it: and the sense and grammar would be improved by putting a "may" before the words "that Bodhisatwa," and so making the address both to the Bodhisatwa and to his individuated portion.

13. As Oriyana covered by his umbrella was performing penance on the banks of the Vachmati, the Bodhisatwa Prithwigarbha suddenly appeared, and established a portion of himself as Gandhesa Vitaraga, the friend of all, and standing in the presence of Lokanatha, may Gandhesa be propitious to us. I adore him.

14. Oriya, delighted at having obtained perfection by his severe ascetic exercises, began, whilst he contemplated the son of Amitabha, to blow the shell. At its sound Khagarbha Bodhisatwa became manifest; that Khagarbha whose heart is obedient to the will of Loknatha, and who having, in obedience to his will, issued from the conch and established a portion of himself as Vakrameswara Vitaraga, departed to his own abode. May Vikrameswara be propitious to us. I adore him.

14. The rendering of this stanza was a matter of some difficulty. Two or three comments were referred to, and the mention of Oriya reintroduced in obedience to the best of them, and to the living authority already alluded to. The "son of Amitabha, mentioned in this stanza is Padma Pani: and the Lokanatha, Avalokeswara, and Abjapani of preceding and succeeding stanzas are different names for the same Deity. He is considered the Lord and Master, in an especial manner, of the eight Vitaragas.

15. May the holy Tirtha Panya where the Saga obtained rest from Tarkshya : may the holy Tirtha Santa where Parvati performed penance to allay her domestic broils : may the holy Tirtha Sankaru where Rudra went through severe austerities to obtain Durga, be propitious to us all. I adore them.

15. In this and the subsequent stanzas the fourteen greater Tirthas of Nipal are particularized, and at stanza 20, the four lesser ones are mentioned generally.

They are all frequented at this day, and the legends are to be found in the Sambhu Puran. They are too prolix for extraction.

Panya tirtha is at Gokarna, where the Vachmati and Amagh-Phula-Dayini rivers unite.

Santa tirtha at Gubgeswari ghat, where the Maradarika joins the Vachmati.

Sankara tirtha immediately below the town of Patan, at the confluence of the Vachmati and Manimati.

16. May the holy Raja tirtha where Virupa obtained the sovereignty of the whole earth : may the holy Kama tirtha where the gamekeeper and the deer went to Indra's heaven : may the holy tirtha Mimalakhya, where the Vajra Acharya performed his ablutions, be propitious to us all. I adore them.

16. Raja tirtha at a place called in Newari, Dhantila, where the Raj-manjari runs into the Vachmati. It is just below the Sankara tirtha Kama tirtha called, in Newari, Phúsinkhel, at junction of the Kesavati and Vimlavati. The former is the river which the Goorkhas have taught us to call the Vishnumati, and so for Vachmati we say with them Vagmati. Besides those two, all the other rivers mentioned are mere mountain streamlets. Nirmala tirtha at a place called, in Newari, Biji Soko, junction of Kesavati and Bhadravati.

17. May the holy tirtha Akara, where treasure is obtained by the despairing poor : may the holy Juyana tirtha where the true wisdom is got by the ignorant solely by reverencing the stream : may the holy tirtha Chintamani, where every desire is attained by those duly performing their ablutions there, be propitious to us all. I adore them.

17. Akara tirtha at a spot called in Newari, Kahang, where the Kesavati and Suvarnavati join.

Jugana tirtha at Kadokhu at junction of Kesavati and Papanasini.

Chintamani tirtha at Pachilihvaivi where the Kesavati and Vachmati join. This is the great Sangam of Nipal, where its two chief rivers (they are but puny ones) unite below the present capital.

18. May Pramoda tirtha where ablution secures pleasure : may Satlakshana tirtha whose waters engender auspicious attributes : may

Sujaya tirtha, by bathing in the stream of which Balasura subdued the three worlds, be propitious to us all. I adore them.

18. Pramoda tirtha at Danaga (I need hardly repeat that these names of places are Newari,) junction of Vachmati and Ratnavati. Satlakshana tirtha at Pagakhucha, where the Vachmati and Charumati flow together. Jaya tirtha at Nakhupoa junction of Vachmati and Prabhavati.

19. May the Goddesses Vidyadhari, Akasyogini, Vajrayogini and Hariti: may Hanuman, Ganesa, Mahakala, and Chura Bhikshani: may Brahmani and the rest with Sinhini, Vyagrihini and Skanda be propitious to us all. I adore them.

19. The four first Deities are esoteric Goddesses of the Swobhavika sect. A comment says, "Above the region of air is fire, above fire water, above water earth, above earth Sumér mountain, above it Surya Mandal. In Surya Mandal is a lotus, out of which, by virtue of Swabhava, Vidyadhari and Akasyogini were revealed, each with her own Vija Mantra." The Swobhavigas usually symbolise these elements or vijas by the letters of the alphabet. The forms of these Goddesses are very much alike, all strictly resembling those of the terrific Goddesses of Brahmanism: and they are all said to be givers of the powers of witchcraft and sorcery to their adorers. The two first are said to be ranked by Amera Sinha with an inferior order of Celestials, and to such an order Hariti must be referred, since she is a Yakshini; but Vajrayogini is a Maha Devi or Goddess of the first order. Hariti's legend resembles that of Sitala, as whom Hariti is constantly worshipped by Brahmanical Hindoos, though her temple is within the very precincts of Sambhu Nath.

Hanuman, Ganesa and Mahakal are names sufficiently familiar to us. Amongst the Deities adopted by Buddhism from Brahmanism, these three are peculiar favourites, because the Bouddha legends justifying their adoption are popular and clever. The proper sentiment of the Saugatas in regard to all these imported Deities is, that they are servants of the Buddhas, and entitled only to "chakar-puja," as a specimen of the legends in virtue of which the gods of Brahmanism have been converted into Bouddha Deities take the following relative to Hanuman. In the Lankavatar it is written that when Rama sent Hanuman to destroy Ravan, Ravan oppressed by the monkey, sought refuge from Sakya in a Vihar. Hanuman unable to violate the sanctuary, went to Rama and told him that he could no farther press his advantage against Ravan, because of Sakya's protection, whose follower Ravan had become. Rama replied 'Go you also and serve Sakya.' In all Sakya's Vihars are to be found the images of Hanuman, Ravan, Mahakala and Hariti. The Swobhavigas invoke Mahakala, under the name of Vajra Vira, as self-existent, whereas the Aishwarikas adopt him *with* his pedigree as the son of Siva and Parvati. Chara Bhikshani, is as her name imports, a female of the mendicant order of Bouddhas. Upon the interesting subject of the classification of their followers by the genuine Bouddha institutes I can only here observe, that though Buddhism is a free and equal association of ascetical saints who know no disparity of rank, save such as each may derive from his own

superior efforts of bodily mortification and mental abstraction, yet it has a technical fourfold division of its followers (very similar to that which distinguished the old Monachism of Europe) into Arhans or perfect saints, Sravakas or studious saints, Chailakas or naked saints, and Bhikshus or mendicant saints.

Brahmani and the Matrikas call for no remark. Sinhini and Vyagripini are their servants. The Aishwarika Skanda is in all respects similar to the Brahmanical Skanda: but the Swobhavikas (*more suo*) make him self-existent.

20. May the two great tirthas, the source and exit of the Vachmati: may the four lesser trithas: may the Kesa Chaitya on the Sankhocha hill, the Salita Chaitya on the Jatochha hill: may the Devi of Phullochha hill, and the Bhagavati of Dhyana prochha hill, be propitious to us all. I adore them.

20. The four lesser tirthas are named Tara tirtha, Agastya tirtha, Apsara tirtha, and Ananta tirtha. They are four kunds, situate at Vachdwara.

Saukhocha hill is that which the Goorkhas have taught us to call Sivapura. In Newari, it is Shiphucho. The legend of Kesa Chaitya says, that Krakut Chand Buddha cut off the forelocks (and so made Bouddhas) of 700 Brahmans and Kshetriyas on the spot. Half the hair rose to Heaven, and gave origin to the Kesavati (Vishnumati) river: the other half fell to the ground, whence arose numberless Chaityas in the form of Singas, a small mass of hair becoming in each the "palus" of the Lingakar Chaitya. Lalita Chaitya, says the Sambhu Puran, was founded by the disciples of Vipasya.

Jatachha hill on which it still stands, is the Arjun of the Goorkhas, called in Newari, Jamacho.

The Devi of Phullochha is Vasundhara, under the form of a conical piece of rock: the hill we call, after the Gorkhas, Phulchok. The Bhagavati of Dhyana Prochha is a portion of Gukyeswari or Prajna, under the form of a conical stone, the hill the Goorkhas have taught us to call Chandragiri.

21. May the Chaitya of Sri Manja on Sri Manja hill, erected by his disciples: may the five deities established in five separate places by Santasri: may the Puchagra Chaitya, where Sakya expounded the unequalled Purana, be propitious to us. I adore them.

21. Sri Manja Hill is the Western part of mount Sambhu, between which Sri Manja there is a hollow, but no separation. The Chaitya still stands.

The five Deities established by Sata Sri are Vasundhara Devi in Vasupur: Agni Deva in Agnipur: Vayu Deva in Vayupur: Naga Deva in Nagpur: and Gakya Devi in Santipur. All are on mount Sambhu around the great Temple. The legend in the Sambhu Puran says, that Santasri was a Kehstriya Raja of Gour Des, named Prachanda Deva, who abandoned his kingdom, and coming to Nipal was made a Buddha by Gunakar Bhikshu, with the name of Santasri.

Pachagra Chitya is on the hollow level of mount Sambhu.

22. May the King of Serpents residing with his train in the Adhara lake: may Vighnantaka: may the five Lords of the three worlds named, Ananda Lokeswara, Harihari-hari-vahana lokeswara, Yaksha malla lokeswara, Amoghapasa lokeswara, and Trilokavasankara lokeswara, be propitious to us all. I adore them.

22. The Legend is the same with that alluded to in stanzas 6, 7, and 24. The serpent King is named Karkotaka, his realm formerly extended all over the valley whilst it was submerged in water. Now he dwells in a tank near the town of Cathmandu assigned to him by Manja Nath, when Manja, let off the waters that covered Nipal. The Adhara lake or tank is called in Newari, Ta Dahong.

The five Lokeswaras are Bodhisatwas. Ananta is called in Newari, Chobha Deo, and Yaksha Malla, Tuyu Khwa.

23. May the esoteric deities named Hevajra, Samvara, Chandavira, Trilokivira, Yogambara, with their several attendants: may Yaman-taka and the other nine Kings of wrath, be propitious to us: may the exoteric divinities Aparimitayu and the rest, Namsangiti and the rest, be propitious to us. I adore them.

23. The esoteric deities enumerated first, belong to the Swobhavika sect. Aparimitayu is in Buddha, and his associates as follows:—

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| 1. Aparimita Gun, Buddha. | 5. Suryottama Prabhasa, Buddha. |
| 2. Guna Ratna Sri, ditto. | 6. Vahuvihita Teja, ditto. |
| 3. Aparimita Parti, ditto. | 7. Asaukheya Kalpa, ditto. |
| 4. Sahasreswara Megha, ditto. | 8. Subha Kanaka, ditto. |

Namsangiti is also a Buddha, and *his* associates as follows:—

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| 1. Dridha Surya, Buddha. | 3. Supuspita, Buddah. |
| 2. Bhaishajna Guru, ditto. | 4. Ratna Keta, ditto. |

24. May Manja Deva, who having come from mount Sirsha with his wives and two Devis divided the southern mountain with his scimitar, built the town of Manja Pattan for the pleasant abode of the human race, and worshipped the deity sitting on the lotus, be propitious to us all. I adore him.

24. The language, physiognomy, architecture, manners and customs of the Newars clearly prove their Northern extraction, and in the Sambhu Puran, a person called Manja Ghok is distinctly related to have led a colony into Nipal from China: for Sirsha Parvata is said to be situated in China, meaning probably Bhote. The making Manja a Dhyani or Celestial Bodhisatwa is a mere trick of modern superstition. The town of Manj Pattan founded by Manja has perished, but tradition still gives it a locality half way between mount Sambhu and the Paspati wood, and tradition is countenanced by the fact, that at this day quantities of building materials are often dug up on the assumed site of the town.

25. May Abjapani, the chief followed by Hayagriva, Jatadhari lokeswara, and the rest, who came from Sukhavati Bhavan, then proceeded to the mountain Putala, and being thence called by the Raja Deva Huta to remove accumulated evils, was established with many rites in Lalitapur, be propitious to us all. I adore him.

25. Hayagriva (said to be the same with Bhairava) Jatadhari and the rest reared Abjapanis (Padma Pani) warders and menials. The names of the rest are

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| 1. Sudhana Kamara. | 6. Akalmritya. |
| 2. Ajita. | 7. Jaya. |
| 3. Aparajita. | 8. Vijaya. |
| 4. Marsainya. | 9. Abhaya Prada. |
| 5. Varada. | 10. Dhanada |

The Buddhmargy legend here alluded to is not supported by the authority of any of the Bouddha scriptures of Nipal, but rests on mere tradition. Abjapani is universally identified with Padma Pani, the fourth Dhyani Bodhisatwa. The application of the name and attributes of the Yogeswara Matsgendra Nath to this Deity is a corruption introduced by the Siva Margi Newars, and scouted by the Bouddhas in whose hands exclusively is the ministry of Abjapani's idol. The Bouddhas, however, have no objection to the Siva Margi Newars, and even Brahmanical Goorkhas making *offerings* to Padma Pani under any name they please, and in fact, all orders and sects unite in swelling the Yatra or procession of this Deity. The Bouddha tradition says, that upon the occurrence of a dreadful famine, Narendra Deva, a Raja of Bhatgong and Bandhudatta, a Vajra Acharya of Pattan, invited Padma Pani to Nipal. A quaint distich familiar to the learned Bouddhas fixed the date of Padma Pani's arrival at 1382 years from the present time. This subject is worthy of more attention than I have yet given it. By due pains (and they shall not be wanting) I hope to procure hereafter some written account of this event.

Notice of two Marmots inhabiting respectively the plains of Tibet and the Himalayan Slopes near to the Snows, and also of a Rhinolophus of the central region of Nepal. By B. H. HODGSON, Esq.

1. *Arctomys Himalayanus* of Catalogue. *Potiús, Tibetensis* hodie. Mihi. Structure typical. Tail not exceeding in length one-fourth of the body and head. Molars five-four, first above unicuspid and cylindrical in its body and tuberculous on the crown: the rest double, low, flat and rather hollow crowned, but with a slight heel on the inner extremity (towards the tongue,) and a groove between two transverse ridges towards the cheek. Pelage of two sorts; hair and wool: hair the more copious, straight, elastic, adpressed, rather harsh, an inch one-

eighth to one and a quarter long: wool wavy, a third less long, not found on the body below, or tail, or head, or limbs. Hair triannulate from the base, with dusky brown and yellow (of a canescent rather than rufescent cast) and black, the last ring much the shortest, and found only on the upper surface of the body: the woolly fur biannulate only, wanting the dark tips of the hairs. General external hue, a sub-rufescent cat-grey: beneath from chin to vent yellow: limbs and cheeks the same, but deeper toned and inclining to rufous: bridge of nose and last two inches of tail, dark brown. Twenty-two to twenty-four inches from snout to vent: tail with the hair, five and a half to six and a quarter. Palm and digits (exclusive of the nails) three and a quarter: Planta, ditto ditto, three and six-sixteenths. Sexes alike, and of nearly equal size.

Habitat Tibet. Social and gregarious.

2. *Arctomys Hemachalanus*, Mihi, Structure typical, but the digits furnished with a basal membrane. Tail exceeding a third of the length of the animal. Molars five-four, the first in upper jaw as in the last: the rest transverse and having their broad crowns sulcated round a horse-shoe ridge, in lower jaw cupped between four tubercles placed at the angles of each tooth. Pelage softer and fuller than in the above, of two sorts, or hair and wool, and nearly in equal quantities. Hairs straight, fine, elastic, and about one inch long: wool wavy and two-thirds only the length of the hair. Both hair and wool triannulate from the base with dusky, rufescent, and black, and nearly in equal proportions, the dark tips being ample wherever they exist, that is, on all the superior surface of the body and head, but not on the belly, nor limbs, nor sides of the head, nor ears; general colour dark grey with a full rufous tinge which is rusty and almost ochereous red on the sides of the head, ears, and limbs, especially in summer. Bridge of nose and last inch of the tail dusky brown. Head and body above strongly mixed with black, which hue equals or exceeds the pale one on those parts. From snout to rump twelve to thirteen inches. Tail five and a quarter to five and a half. Palma, less than the nails, two and three-sixteenths. Planta, ditto ditto, two and fifteen-sixteenths. Sexes alike, and of nearly equal size.

Habitat the Himalaya with the Bhote pergannahs or Cachâr in the immediate vicinity of the snows. Social and gregarious.

Remarks.—I cannot doubt that the above two species are distinct, because the Trans-Himalayan animal is nearly twice as large as the Himalayan, and possesses a proportionately much shorter tail, not to dwell on the difference of habitat, which however seems to be invariable. In structure and in manners the two species, for the most part, correspond entirely, and the difference of colours is chiefly in intensity of hue.

Many years ago I possessed, alive, a specimen of the larger or Tibetan species of *Marmot*, which was as tame as a rabbit, and lived at large in the house. I have lost my notes on it, but recur to the fact, lest any one should tax me with multiplying species incautiously. I cannot now doubt, on full consideration, that the larger and lesser species are distinct; and I may add, that in my old specimen of the larger one, the crowns of the cheek teeth are nearly levelled by attrition. I have recently had two or three of the lesser species alive for months in my garden. The last lived above a year and quarter with me, when it died of an accidental wound. These individuals dwelt together in amity, were very somnolent by day, more active towards night and in warm weather, but did not fall into a permanent sleep in the cold season, perhaps because they were regularly exposed to the sun in the day time. They were fed on dry grains and on fruits, such as pears, pomegranates, and plantains. They slept rolled into a ball and buried in the straw, with which their case was amply supplied. Over their meals they would frequently chatter a good deal in a very audible tone, but were usually quite silent. They were very tame and gentle for the most part, but would sometimes bite and scratch like rabbits, uttering a somewhat similar cry. On foot they are by no means active, though more so than the *Rhizomys*. Nor are they very prone to digging, but will slowly excavate a subterrene abode for themselves if permitted. Their structure is plantigrade, but of the ambulatory, not fossorial or scansorial modification of that type; and, whilst their massive heads and jaws and powerful incisors indicate immense power in reaching, as well as masticating their food, their talons exhibit no development of the pre-eminent digging type. The following particulars of the external and internal organization of the lesser species will probably prove acceptable to the real students of Zoology. Head large, massive, conico-depressed, with eyes and ears equally and considerably remote

($1\frac{5}{8}$ inch). Culminal line of the head considerably arched along the nasal bridge, at the end of which the curve is lost in the prominence of the orbits, and subsequently in the fatness of all the cerebral part of the head, muzzle nude in front only, and not grooved. Upper lip not cleft, but full and incurved to the sides, so that the inside or palate is partially hairy. Lower lip very short and adpressed, nares short, ovoid, scarcely angulated or turned to the sides. Incisors very strong, white, rounded anteally, the upper pair directed nearly downwards, the lower pair forwards in a small crescented curve from the bases, where a large mass of gland is found on dissection, but no cheek pouch. Molars five-fourths, the first above unicuspid, and furnished with one tubercle on the subconic crown: the rest with broad transverse crowns, either cupped between four tubercles at the corners, or sunk within a horse-shoe ridge, the ends of which point to the cheek. Mustachios longish reaching to ears, not rigid, but very elastic. A similar but smaller tuft on each cheek, and above and before each eye, and others still smaller on the chin and behind the carpus, as well as before it or in front of the arm. Eyes medial, midway from snout to ear, pupil oblong. Ears small, erect, rounded, as broad at top almost as below, and very simple in structure, or devoid of all membranous processes. Helix inflected anteally, but not fissured posteally, and moderately clad, inside and out, as far down as the conch, the longest hairs forming a fringe along the upper margin, but *not* so that the ears can be called tufted. Body full, moderately elongated: limbs medial, plantigrade, ambulatory, of moderate subequal strength before and behind. Fore-arm about as long as the hand, including the wrist and nails. Palm wholly nude, soft, pretty full with two large subtrigonal basal or carpal pads, the inner of which supports and envelopes the rudimentary thumb, which has however its tip free and furnished with an andromorphous nail. There are three round terminodigital balls for the four fingers which are gradated as in man's hand, but have their bases connected by a distinct crescented membrane. Behind the digits are about as long and as stout as before, and are similarly connected by membrane, but the fifth digit or thumb is here fully developed and free, as long proportionately as in our hand, but rather feebler than the other digits, and having like them an anteal, not antagonistic position. The sole is nude to the heel, and about twice as long as the longest digit, soft and

smooth, with four proximate roundish balls for the bases of the five digits, and two small vague ones for the metatars placed subcentrally as to the entire length of the planta, and transversely in the same line. The tail without the hair is about half the length of the body without the head. It is not thick at the base, and thence gradually tapers, being rather fuller of hair than the body, and the hair exceeding the tail itself by about one inch, where it forms a blunt termination.

The anal and genital parts are void of any peculiar glands or pores. In the females the teats are twelve, and extend from the armpits to the back of the groins. In one specimen I find but ten mammæ: the larger species has twelve decidedly. The talons have the general character of those of our *Mesobema*, [olim *Urva*], being of medial subequal size, hardly larger before than behind, moderately compressed, rounded above, and scooped below towards their blunt extremities. The intestines in one specimen (female) measured ten feet and four inches: in another (male) eight feet and a half, and in the former the stomach along the greater arch was five inches and a half, and along the lesser two inches, while in the latter it was only four by one and a half. In the female, whose intestinal canal was ten-four, the cæcum was found at three-two from the anal, and was two inches long by one and a half in diameter, cylindrical in shape and curved lunately as it lay in situ. The larger gut was one inch wide, and the lesser half that width. The stomach was purely membranous and (as flatted on a table) of an attenuate pyriform shape, having the upper orifice terminal, and the lower remote from it, but so as to leave a good sized fundus.

N. B.—There is a prior description of the large Marmot in the *Journal*, Vol. X, p. 777.*

* In Mr. Ogilby's 'Memoir on the Mammalogy of the Himalayas,' published in Dr. Royle's Volume on the Botanical productions of that immense range, we read that — 'Dr. Falconer, in the report of his recent journey to Cashmere and Little Tibet, mentions a rodent under the name of the Tibet Marmot, which he says was first found on a bleak and rocky tract of country, immediately after passing to the northern slope of the great Himalayan range; but we have no further knowledge of its characters: however, this is precisely the locality in which mammals of this description might naturally be expected to abound.'

It is not improbable that the *Lepus hispidus*, Pearson, described in the 'Bengal Sporting Magazine,' as quoted by Dr. McClelland in *Proc. Zool. Soc.* for 1839, p. 152, should also be referred to this genus: I hope to be soon able to procure specimens of it.—*Cur. As. Soc.*

3. *Rhinolophus Perniger*, Mihi. Structure typical. Inguinal teats, distinct large cup-shaped frontal sinus. Tongue considerably extensile, fleshy, full, smooth anteaally, subpapillate towards the gullet, nose-plate spreading amply to sides, and exceeding the edge of the upper lip, flat and free all round the margin, merely membranous, furnished with two salient processes, whereof the lower or anteaal one is like a door-knocker, and the upper or posteaal, a graduate spire. Ears very large, much longer than the head, shaped like a broad acutely pointed leaf, transversely striate, nude save at base, their fine points slightly drooped; the false or inner ear semicircular in form, and anteaally much attached to the cheek, so as to fold over the orifice of the auditory passage, where it doubles upon the anteaal part of the helix. Tail six-jointed, shorter than the body, and its full membrane squared nearly between the spread radii or metatarsal processes. Wings ample: thumb free and furnished with a nail: first finger one-jointed and no nail; the rest three-jointed and unarmed. Fur longish, very soft, lax and slightly curled. Colour uniform black, embrowned on the nude cutaneous parts, slighted tipped with silver on the back. Snout to rump three inches and a quarter (female,) tail two and one-eighth; head one and five-sixteenths, expanse seventeen; ears from anteaal base one and eleven-sixteenths, from the crown of the head or posteaal base one and six-sixteenths; fore arm two and five-eighth; second or longest finger four; leg or tarse one and three-eighth; foot from os calcis to end of talons thirteen-sixteenths.

Habitat, the central region of the Sub-Himalayas: shy: never approaches houses or the cultivated country: dwells in the deep forests and caves of the more precipitous mountains. [Mr. Hodgson has sent some other spieces of this genus, with descriptions; but as the Society expects shortly to receive from Europe M. Temminck's Monograph of the *Rhinolophi*, I deem it better to await the arrival of that treatise on the group, before venturing to determine Mr. Hodgson's and some other species of Horse-shoe Bats in the Museum.—*Cur. As. Soc.*]

Nepal, February, 1843.

B. H. HODGSON.

*Proceedings of the Asiatic Society.**Wednesday Evening, 3rd May, 1843.*

The Honourable W. W. BIRD, President, in the Chair.

Captain GOODWYN and Lieut. STRACHEY, of the Corps of Engineers, proposed at the last Meeting, were balloted for and duly elected Members of the Society.

Ordered.—That the usual communication of the election be made to Capt. GOODWYN and Lieut. STRACHEY, and that they be furnished with the rules of the Society for their guidance.

Messrs. BRANDRETH and CUST C. S. were proposed as Members of the Society by the Honourable the President, seconded by Sir W. H. SETON.

Library.

The following Books were laid before the Meeting :—

Books received for the Meeting of the Asiatic Society, on the 3rd May, 1843.

The Oriental Christian Spectator. Bombay, April 1843. Second Series. Vol. iv, No. 4. Presented by the Editor.

Proceedings of the London Electrical Society, 1842-3, pts. 5th and 6th. Presented by the Society.

London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science. 3rd Series. December 1842. Vol. xxi, No. 140.

Annals and Magazine of Natural History. London, November 1842. Vol. x, No. 64.

Statistiske Tabeller for Rongeriget Norge 1er till 5e. Reekke irreg. (Tableaux Statistiques sur la Norvège. Série 1er,-5e.) Presented by the University of Christiania.

Nyt Magazin for Naturvidenskaberne 11 Hefter (Nouveau Magazin pour les Sciences Naturelles, publié par la Société Physiographique á Christiania, 11 Cahiers). Presented by ditto ditto.

Lærebog i Mechanik of Chr. Hansteen, 2 bande, (Cours complet de la Méchanique, par le Professeur C. Hansteen, 2 tomes). Presented by ditto ditto.

“Heimskringla” eller Snorre Sturlesons Norske Kongers Sagaer med 3de, Karter og fure Slaalsteb, (Chroniques des Anciens Rois de la Norvège, par Snorre Sturlesons, édits par T. Aall, avec Cartes et beaucoup de Planches). Presented by ditto ditto.

Abels Varker, 2 bande, (Œuvres complètes du Mathématicien Novègien, N. H. Abel, redigeès par ordre du Roi, par le Professeur B. Holmboe). Presented by ditto ditto.

Descriptio Ornamentorum Aureorum et Nummorum in Norvegia Repertorum, 1825, scripsit C. Holmboe. Presented by ditto ditto, (2 copies).

De Nummis medii Aevi, in Norvegia nuper Repertis particula Posterior, 1837. Presented by ditto ditto.

Aarsberetning for det Kongelige Norske Frederiks Universitets for Aaret 1840, (Annuaire de l'Université, 1840). Presented by ditto ditto.

Norges Statistik af Schweigaard. 1st deel, (Statistique de la Norvège, par Schweigaard, tome 1er). Presented by ditto ditto.

De Mutationibus Virgæ Magneticæ, Auctore Christophoro Hansteen, 1842. Presented by ditto ditto.

Index Scholarum in Universitate Regia Fredericiana, 59 ejus Semestri, 1842. Presented by ditto ditto, (2 copies).

Gaea Norvegica, 1838, Earstex Heet. Presented by ditto ditto.

Universiteterne i Christianas. Upsala, 1836. Presented by ditto ditto.

De Prisca re Monetaria Norvegicæ, scripsit C. A. Holmboe, 1841. Presented by ditto ditto.

Indby Delseskraft i Anlidning of den Høitidelige Nedlæggelse of Grundstenen til Nye Bygninger for det Kongelige Norske Frederiks Universitet Trediveaarsdagen efter dets Stiftelse den 2den September, 1841. Presented by ditto ditto.

Read letter from Mr. Officiating Secretary DAVIDSON, No. 48, of 12th ultimo, communicating the acknowledgments of the Government for the offer, by the Society, of copies of a Sindee Vocabulary about to be published under its superintendence, and stating, that twenty-five copies of the work would be sufficient for the use of Government.

Read letter from Capt. H. M. DURAND, Private Secretary to the Right Honourable the Governor General of 8th ultimo, informing the Secretary that His Lordship would wish twenty-four copies of the Sindee Vocabulary to be sent to the Government of Bombay, the like number to the Secretary in the Political Department with the Governor General, and one copy to Major Leech, C. B.

Read letter from N. B. E. BAILLIE, Esq. of 24th ultimo, accepting the office of Member of Committee of Papers, and promising to render every assistance in his power to the best of his ability.

Read the following letter from Mr. R. S. MALING, of 2nd ultimo, presenting specimen of some Oil extracted from Nuts, the produce of trees called by the Natives Nipal Ukrote.

DEAR SIR,—I beg to forward herewith a small quantity of Oil extracted from Nuts the produce of trees called by the natives Nepal Ukrote, of which I have some few in my compound. I am unable to give you the real name of the tree, but in order that you may discover it, I send you, accompanying, some of its leaves and blossom, also some of the nuts it bears. The leaves so far as I can recollect, are precisely similar to those of the Sycamore, and the tree itself resembles it very much, so far so indeed as to lead me to suppose, (until I observed the nuts it bore,) that it was the Sycamore tree. From enquiries that I have made, I learn that the full grown trees I have were planted by Mr. Clerk of the Civil Service, some 28 or 30 years back; they flourish well here, and are of speedy growth. I planted some last rainy season, which are already

five and six feet high, the tree itself is ornamental, and to shew how profitable a plantation of them would be if cultivated for the sake of the oil, I annex the following:—

Say, 40 Trees upon each Beegah,	40
Each Tree averaging $1\frac{1}{2}$ maund of oil,	$1\frac{1}{2}$

60

Such oil would fetch at the least even in Calcutta, 12 Rs. } per maund.	12
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Rs. 720 each Beegah,

from which must be deducted the cost of manufacture, which, however, would in all likelihood be paid for by any crop on the same ground, such as Indigo, Mustard, &c. &c. I extracted the oil sent you by pressure, in a manner exactly similar to that in use in the manufacture of cold drawn castor oil; the nut itself I have eaten, and found very palatable, far more so I think than the walnut, and I never experienced any bad effects from eating it. The natives say it is a purgative, but I did not find it so. At the present season the tree is particularly handsome, being covered with a handsome white blossom, which contrasts well with the large dark leaf of the tree. It is my intention to send some of the young plants I have to the Agricultural Society, and I shall have much pleasure in sending you as many young trees, and as much seed as you may require.

Yours very faithfully,

Baugundee, 2d April, 1843.

W. MALING.

P. S.—You will not fail to observe the remarkable difference between the leaves attached to the blossom, and those separate, and yet they are off the same tree.

Read the following Letter and Memorandum from Captain MACLEOD, of Moulmein, of 10th ultimo, on a specimen of Black Dye, of which samples were on the table:—

MY DEAR TORRENS,

The accompanying will speak for itself, the black colour conveyed by the Dye is the most beautiful I have seen. I would write more on the subject, but the letter and the Dye have just reached me, and I fear to delay, the Steamer being on the point of starting.

Yours very truly,

Moulmein, 10th April, 1843.

W. MACLEOD.

Zimmay, February, 1843.

“I have the pleasure of sending you a specimen of the Black Dye. I made the experiment myself, and find it is produced from the pulp growing round a kind of plum of a very light colour inside, until broke, exposed to the air and sun, when it gradually assumes the intense Black Dye, and becomes insoluble in water, and must go through the same process as Indigo, both being insoluble in water. The manner of dyeing silk is very simple; it is immersed in a quantity of the pulp mixed with water sufficiently thin, and either dipped or rolled over the silk which immediately being exposed to the sun grows darker, and if not sufficiently dyed, this is repeated; it requires but a small quantity to dye a quantity of silk.

I shall bring down with me a piece of Long Cloth I have had dyed; the process of dyeing cotton is different, it is first put in a solution of Indigo, dried, and then immersed and exposed to dry, becomes entirely black. The natives keep the Indigo in solution; with

it is mixed a great quantity of lime; no boiling or hot water is used in the process. Should you have an opportunity, send the specimen to the Society in Calcutta in my name, and I will bring a box down to be sent to England, as well as some Indigo; and enquire of them, if there is any premium for the production of a Black Dye that requires no sulphate of iron.

Read the following letter from Professor HOLMBOE, of the university of Christiana.

Christiana, le 21 Sept. 1842.

MESSIEURS.

Les Directeurs de la Société Asiatique de Calcutta.

Etant informé par mon compatriote Mr. Bonnevie, que Messieurs veulent bien vous mettre en rapport avec notre Université afin d'échanger des articles scientifiques, je prends la liberté d'envoyer ci-joints 215 monnoies, dont les 160 sont de la maison d'Oldenburgh, non plus en cours, et les 55 des monnoies du 12^{me} siècle récemment découvertes, sur lesquelles j'ai publié un mémoire, dont un exemplaire est aussi ci-joint.

Possédant déjà plusieurs des monnoies, que les Anglais ont fait frapper pour les Indes, il nous serait particulièrement agréable de recevoir des pièces frappées par les princes indigènes. Sur tout il nous intéresserait beaucoup de recevoir de celles, qui passent sous le nom de Indo-scythiques ou Indo-bactriques, et dont Messieurs Masson et Honigberger ont trouvé de grandes quantités dans l'Afghanistan.

Veillez agréer l'assurance de la parfaite considération, avec laquelle ja'i l'honneur d'être,

Messieurs,

Votre très humble et très obéissant serviteur,

F. HOLMBOE,

*Professeur des Langues Orientales à l'Université
Royale de Christiania, et Directeur de son Cabinet de Médailles.*

Read the following letters, giving cover to papers for publication in the Journal of the Asiatic Society; viz. of 21st April, from Mr. Officiating Secretary DAVIDSON, with a Report by Mr. Commissioner LUSHINGTON, on the results of the mining experiment conducted at "Pokhree in Gurhwal."

Of 15th April, from Capt. H. M. DURAND, with a brief History of Khelat, by Major LEECH, C. B., and a Journal of a Tour through parts of the Punjab and of Afghanistan, by Agha Abbas of Sheraz, arranged and translated by Major LEECH, C. B.

Of 11th April, from E. C. RAVENSHAW, Esq. C. S. with a memorandum on the construction of a "Portable Meridian," ordered to be published accordingly.

Read letter from Mr. JAMES REYNOLDS, Secretary of the Oriental Translation Fund, dated London, 14th February 1843, requesting remittance of the subscription of the Asiatic Society for 1842 and 1843, amounting to £21.

The remittance ordered to be made by a set of bills.

The Secretary presented to the Society sundry Fire Arms of the manufacture of Lahore, Cabool, and various places of Hindoostan, being as follows :—

Dokh, or Hindoostanee cut-and-thrust Sword.

Two Peshawur Firelocks, mounted after the Native and English fashions, lock made by Cashmeeree Gunsmiths of Loodiana to imitate Tower locks.

A Gun.

A Lahore Matchlock, purchased from one of Runjeet Singh's *Ghorchurras*.

Knife used by the tribes about the Khybur Pass, as Afreedees, Momunds, &c.

A small box, containing some dust of the Sandal-wood gates of Somnath was also presented, and examined by the Members. The impression was general, that the gates were really of Sandal-wood. A copy of the Inscription and the Report of the Committee of Engineer Officers had been sent with the box, but had been sent off for early insertion in the Journal without any copy being retained. The drawing of the gates had not yet reached the Secretary's hands. The subject was therefore ordered to be again brought to notice at the next Meeting.

Read the following Report from the Curator of the Museum of Economic Geology, for the month of April last :—

Report of the Curator Museum Economic Geology for the month of April.

Museum Economic Geology.—We have completed searching out and arranging our Indian Copper Ores, and the collection comprising 72 specimens from Kemaon, Gurhwal, Nepal, Shekawatee, Ajmere, Nellore, and Ramree is now upon the table. Much is yet wanting to complete this series, but we shall no doubt soon receive contributions. Mr. Commissioner Lushington's report on the Government experimental working of the Kemaon mines, which is presented this evening from Government, is a highly valuable record for future guidance, but we may remark upon it, that the outlay and the depth penetrated are trifling when compared with mining adventures in Europe, so that rich beds or veins may still remain to be reached by future adventurers in this locality.

Mr. Blundell, Commissioner, Tenasserim Provinces, has sent us an interesting paper, with specimens, being an analysis by Dr. Ure of London of the Magnetic Iron Ores and Limestones of Tavoy, which are upon the table. His letter is as follows :—

Moulmein, 7th April, 1843.

MY DEAR SIR,—Having last year sent home some specimens of the Iron Ores of these Provinces, I have lately received a chemical analysis of them by Dr. A. Ure, and thinking they might prove acceptable in the Museum of Economic Geology, I now beg to forward to your address, a box containing similar specimens.

Inclosed is a copy of the memorandum which accompanied the specimens I sent to England, and of Dr. Ure's report on them.

The box is on board the Honorable Company's Steamer *Hooghly*, and will be delivered to you by Captain Ross.

Yours truly,

G. H. BLUNDELL.

From Captain Newbold, M. N. I. Assistant Commissioner of Kurnoul, we have to acknowledge a specimen of a remarkable barren soil from that part of Southern India, the label to which best describes it.

Jairi Soil from Kurnoul, infertile, very impervious to water, used for flat roofs of native houses in Kurnoul as a protection against rains.

I have not yet been able to examine this soil, but it is remarkably like one from Cheduba brought by Captain Halsted, also quite infertile, and is probably like it, rendered so by being almost a pulverulent Iron Ore, rather than a soil.

Geological and Mineralogical.—We have received from the University of Christiana, in addition to several valuable works noticed in the Librarian's report, a small but valuable series of Fossils and Geological and Mineralogical Specimens, in all 50 in number, which are on the table. Of these, the Fossil and Geological Specimens are entirely new to our collection, but some few of the Mineralogical ones we already possessed. It is to the exertions of Captain Bonnevie of Tirhoot, a member of that University, that the Society is indebted for this very handsome donation, which it will be our duty to return in the best manner we can, and by the earliest opportunity. Captain Bonnevie's letter is as follows:—

To the Secretary of the Asiatic Society, Calcutta.

SIR,—It is about nine months since, at the suggestion of Mr. Blyth, I wrote to the University of Christiana in Norway, proposing an interchange of natural productions and scientific works between that body and the Asiatic Society. I have now the honor to enclose a letter, with accompanying lists of articles sent by the University, and beg to inform you, that the packages shall be forwarded to the Society immediately on their arrival.

I have been requested to inform the Society, that in the list of minerals, the "Acmite" Crystal, No. 35, is now very scarce, as the spot where it is found is becoming exhausted, and also, that the specimen of "Gadolinite" No. 44 is of great value. It is a very rare production, and mostly found in small pieces mixed with other substances.

The University would feel very gratified to receive in return any minerals or rare fossils peculiar to Asia, and if procurable, Casts in Gypsum of the cranium of the Sivatherium and other fossil animals of the like kind that have been discovered in this country.

In the lists of books, you will observe a work styled "De Mutationibus Virgæ Magneticæ," by Professor Hansteen. I have been requested by him to suggest to scientific men in India, to make as many observations as possible on the dip and the variation of the Needle. As the suggestion of a learned and influential body like the Asiatic Society will have weight, when those of a humble individual like myself would be deemed presumptuous; perhaps the Society will be kind enough to assist the Professor by urging these observations on its numerous scientific members scattered over India.

I have the honor to be, Sir,

Your most obedient servant,

C. S. BONNEVIE.

RUNGPORE,

The 19th February, 1843.

Mr. Frith has kindly sent us a curious specimen of Wood reduced to brown Coal and Lignite, which was taken from a well now digging at Dum-Dum by his father.

H. PIDDINGTON,

Curator, Museum Economy Geology.

For all the Presentations, the thanks of the Society were accorded.

JOURNAL
OF THE
ASIATIC SOCIETY.

*Extract from Note Book regarding the Genus Paussus. By Capt. W.
J. E. BOYES, 6th Light Cavalry, Assistant to the Commissioner
Kemaon and Gurwhal, with four Plates.*

[We have, from press of matter and other causes, been hitherto unable to do justice to Capt. Boyes' valuable and interesting communication: not the last we hope from his pen on a subject so little known, and of such boundless extent as Indian Entomology; and those who know the difficulties attending the creditable execution of delicate plates by native artists, will we trust, as well as the author, make due allowances for our anxiety that his beautiful labours should not be marred in our hands.—EDS.]

Having observed that the genus *Paussus* among the Coleopterous Insects, has been placed with the *Tetrameræ* in every work on Entomology it has hitherto been my fortune to peruse, I am induced to forward to you the accompanying extracts from a note book which I have kept some time past, in hopes that the observations therein cited, may induce others more competent than myself to observe, and perhaps assign what I conceive might be a fitter place to the above-mentioned Genus.

Stark in his *Natural History*, correctly states, as far as I can vouch from my own experience, that the number of joints in the tarsus of the *Paussus* is five; which circumstance alone, should, I imagine, have proved a sufficient reason, for the removal of this Genus from the *Tetramerous* to the *Pentamerous* section of *Coleoptera*; but as it will be observed from the following notes, that in addition to its general form, which in outward appearance approximates to many of the *Carabici*, that it is also, similarly with several of the latter genus,

endowed with the faculty of crepitation, attended with the same results observable in many of these, their removal may (I think) well be warranted from the place they now hold to somewhere in the vicinity of *Aptinus* or *Brachinus*.

Regarding their form, it may be noticed, that the head is generally narrower than the thorax, or at most of the same width, eyes prominent, mostly reniform, sometimes ovaliform or gibbous; the body when viewed from above appears oblong, with the elytra either of one breadth throughout, or narrowed anteriorly, depressed and truncated posteriorly in most species; those which have the elytra of a uniform breadth, curved or sub-cylindrical above, present a rounded emargination to the wing cases at their latter extremities. The palpi though small, are salient, the labial ones being subulate; those of the maxillaries appear composed of four joints, of which the first is thicker than the rest; they differ from the labials in being arched from about midway, turning inwards until their apices are so approximated, that they appear to meet.

The abdomen is oblong, oval and tumid at the posterior extremity, sometimes of one breadth throughout, but more generally narrowed anteriorly. The femur in each fore-leg presents in many species a longitudinal and rather deep sulcus, which when the leg is contracted admits the tibia. The tarsus is composed of five joints, of which the first, though very minute and nearly concealed beneath the spine of the tibia, is still very distinguishable with a magnifier, particularly when the insect is in motion. The thorax resembles the form which obtains in that part of most of the *Carabici*, being generally cordiform, truncated posteriorly, with margins produced, though some species have it angulated in front and irregular.

In flight, the *Paussi* are exceedingly easy and agile, the lower wing when expanded being in comparison to the size of the insect of large dimensions, and when they alight, the movement is so sudden, and the elytra are closed so instantaneously over the lower wings, that they appear as having dropped down to the spot on which they rest, and where they generally remain several seconds previous to again attempting to move; facts which I have also remarked as practised by many *Carabici*. Its walk, however, entirely differs from that of this last mentioned genus, for instead of being nimble and occasionally

rapid, I have never seen it moving but in a slow and sedate manner, at which time the antennæ are extended to the front of the head, and to these is occasionally given an upward vibratory motion. What should bring these insects in nearer conjunction with the genus *Carabus* is the curious fact, that on being seized they emit from the anus a very acrid liquid, accompanied by an explosion, and attended with a strong scent resembling that produced by *Brachiini*, and other allied genera when similarly treated; and although in minuter quantities, it is abundantly sufficient to produce a very sensible heat, and the crepitation may be distinctly heard and felt. Wherever the skin has been subjected to its action, discoloration immediately ensues of a reddish brown color, which soon after turns to a brownish black, resembling the stain produced by the touch of caustic, and which remains permanently fixed for many days after.

The explosion is occasionally repeated three or four times successively, at which periods a vapor may be observed to accompany each crepitation, attended with a strong, and very penetrating odour, something like that of nitric acid.

In one species I possess, the last segment of the abdomen is provided with two large bundles of hairs, resembling densely set brushes, which under the microscope are objects well worthy of examination; each hair appears like a fibre of golden-colored glass, and so closely are they arranged, that it is only on being disturbed that their true character can be discerned; yet notwithstanding the aid afforded by the movement, the hairs composing this curious appendage are only so far separable as to appear like a wetted painting brush. In another insect of the same genus, and probably differing only from the above-mentioned one in sex, the abdomen beneath, near the penultimate segment, is provided with two curved spines in addition to the hairy protuberance already noted. In a third, the posterior end of each elytra gives support to a moveable incurved spine, projecting over the last segment of the abdomen, and which when submitted to the microscope, appears strongly acuminate, and somewhat in the form of the extremity of a scorpion's sting.

In addition to these curious organs, several species are provided near the exterior margin of the elytra, at the posterior extremity, with a small papillaceous follicle, giving cover to an elongated appendage of

the same description, which is attached to the upper exterior margin of the abdomen, and which by the aid of a pin's point may be lifted up, and in a slight degree outspread, but collapsing immediately the impediment is removed. It would be difficult to assign reasons for the different addenda in the form of these insects, and observation alone can afford a clue to their uses, but that they are objects of extreme utility, and perhaps absolutely necessary in their economy as is easily to be conceived. Possibly the last mentioned appendages may be a source of further protection granted these curious insects, which are brought into play as danger may threaten; for in one I captured on the night of the 30th ultimo, and which flew into the lights on the table, I observed that when placed under the microscope, if these papillæ were touched, that they possessed the power of discharging a yellowish milky liquid, resembling pus in consistency, and which speedily overspread the lower part of the elytron, granulating into small egg-shaped grains. On repeating the irritation the same results occurred, and in order to be certain of the fact, I tried each elytron twice with the same effect. In my first trial the emission was so sudden and took me so much by surprise, that viewing the insect through the medium of the microscope, I fancied it sufficiently near to be injurious, and incontinently let it fall. I should mention, that in all these trials, each emission was accompanied with a faint acidulous odour. Although the appearance of each discharge obtained on the elytron, I am inclined to believe, that properly speaking, it issued from the foliaceous appendage on the abdomen, and that it spread over the wing case in consequence of the peculiar shape of the shards at the part which overlaps the extremity of the above-mentioned organ, but my experiments were unfortunately closed, ere I could satisfy my doubts, as my servant in removing the microscope to another table contrived to lose my specimen; since which I have been unsuccessful in making a recapture. At one time previous to my loss, I was inclined to believe that a minute perforation existed in the exterior angle of each elytron, with margins sufficiently elastic to allow the liquid to pass through, closing immediately after the emission, but I could not bring myself to any certainty on this point.

After capture, the *Paussus* may be made to lose its powers of crepitation by too much irritation, at which time it will resort to a very

common *ruse* practised by many insects, and simulate death, contracting all its legs towards, but not close to, the abdomen, in which position it will remain so long as it continues to be disturbed. This circumstance, as far as I have hitherto noticed, is not a common practice among the Carabici, though very generally adopted by almost all the Heteromeræ.

I may here observe, that many of the latter section of Coleoptera possess the power of forcing out a very caustic liquid, which exudes from the pores of the abdomen, and at the joints between the femur and tibia of each leg, a practice commonly resorted to when they are being seized. This liquid stains the skin wherever it happens to touch, to a purplish black, remaining on the part for many days after; and so corrosive is its nature, that it is only when the epidermis peels off, that the stain is removed. If plunged in hot water, a strong emission takes place from the anus, and the water is discolored to a purple, or ink black, according to the number of insects used, or requiring to be killed. In a similar treatment of a *Paussus*, a crepitation may be heard, and the abdomen becomes greatly distended, probably by rarefaction of air contained in vessels which give their assistance in its explosive powers, and the part retains the inflated appearance until a small perforation has been made in it with a needle's point, or such like instrument, which allowing the escape of the confined air, enables the abdomen to contract to its natural size. The same fact is peculiarly remarkable in many species of *Brachinus*.

Regarding the habits of the *Paussus*, my experience can give little or no aid, for of the seven species which I possess, one was captured on a heap of manure while searching for *Slaptryini* at Mhow in Malwa; a second came accidentally into my net while sweeping in some high grass at Sultanpore, Benares; three species were taken at night, generally between the hours of nine and ten P. M., having been attracted by the light on the table; another was rescued from the clutches of a small black ant, which circumstance I notice merely, because a belief exists, that the *Paussi* inhabit ant-hills, and the last was found crawling up the wall of my bathing room, from which the only conclusion I can arrive at is, that they are most frequently on the wing at a late hour of the night, and as noted in my memoranda, generally after rain. I now proceed to give the extracts alluded to, just as they stand, together

with drawings, from which the accompanying sketches have been taken. The originals being colored, I have preferred doing the copies in outline, that a lithograph might be the more readily and correctly produced, should this article be considered worthy of publication. The original drawings have in all instances been taken from the living insect, and which I shall be happy to forward if required. In the two first, Nos. 1 and 2, the minutiae were not alluded to, and being at some distance from my collection, I regret I am at present unable to give any delineations of their forms; latterly, having taken greater interest in the genus, more has been done, and it now only remains with me to assure you, that in the facts and experiments cited, I have always leaned to the doubtful side, and I therefore trust, that the errors which have crept in, (either as regarding the characterizing of my specimens, or the conclusions I may have arrived at,) will receive the indulgence an unpractised hand may merit.

No. 1. Fig. 1.—Mhow, July 19, 1839.—Genus *Paussus*, length 7-20th of an inch, body brown, deeper in the middle of the elytra. Antennæ of two joints, of which the last is large, cuspiform, and having dentated edges with a scallop between each tooth, apex rounded exteriorly, basal angle produced, acuminate and forming a tooth at the end of the superior margins. Lower portions carinated, front view resembling the bows of a boat, head light brown, rounded posteriorly, emarginated in front, sunk nearly to the thorax, and bearing a minute depression in the centre of its upper part in the form of a diminutive horse-shoe. Eyes round when viewed from above, reniform when seen in flank. Thorax sub-octagonal, with rounded margins anteriorly, angulated and scolloped at the corners posteriorly, bisected in its centre, the posterior portion bearing a strongly produced emargination, which crosses transversely in the form of a bracket. Tarsi simple, cylindrical, the last longest, the first very small, almost invisible, of five joints in each leg, all of which are furnished with hairs beneath. Elytra truncated posteriorly, of a uniform width throughout, slightly depressed, body oblong, flattened, palpi conical, not very salient, maxillary ones tumid at base and over-arching the labials. Taken on a heap of manure at Plassie near Mhow.

Note.—This is the first insect of the kind I have seen at this place, and differs very much from the one I captured at Nusseerabad, which,

I included in the collection given to Dr. J.'s lady, since taken to Edinburgh.

No. 2, Fig 2.—*Mhow, July 27, 1839.*—Genus *Paussus*, length 6-20th of an inch, body brown, rather deeper in color near the sutural margin of the elytra. Antennæ of two joints, the last having an elongated pedicle resembling an intermediate joint, the club is pear-shaped when viewed from above, irregular if seen in flank, edges compressed, forming a carina which is produced into a small tooth near the basal angle. Head has the front slightly emarginated in front and rounded, narrower than the thorax from which it is exerted, eye rather large for the insect, rounded when seen from above, reniform when viewed on the side. Thorax cordiform, broadly truncated posteriorly, having a transverse sinus crossing its centre. Elytra narrowed anteriorly, rounded on the posterior external margin, squared on the internal one, abdomen tumid and very like many of the *Carabici* I have been lately taking. Tarsi of five joints, the first of the posterior tarsus scarcely discernible, unless the foot is put in motion; last joint longest, all of them cylindrical or ob-conical, and furnished with a few hairs beneath.

Note.—This insect came into the lights on the table sometime after gunfire last night.

No. 3, Fig 3.—*Sultanpore, Benares, June 21, 1840.*—Genus *Paussus*, length 10-20th of an inch. Antennæ of two joints, the last of which is massive, spindle-shaped when seen from above, irregular when viewed at the side, upper margin produced, and forming a recurved tooth at its basal angle, at the side of each club. Near the base is a slight impression somewhat in the form of a cocked hat, three rather deep sulci cross the club near the centre, extending half way down each side. The head, thorax and antennæ, are a light reddish brown. The under-part of the body, together with the abdomen and legs, are of a dark brown, tarsi almost black. The elytra are black with a margin of sienna brown, or light chesnut, and are densely covered with silvery hairs, apparent when viewed through the microscope. Near the posterior external margin of each elytron, is a curious appendage I have not previously observed in these insects. The abdomen has its latter segments very broad, and appears distended. The thorax is cordiform, broadly truncated posteriorly, with the posterior external angles slightly produced and rounded, a deep sinus in the form of a bracket

appears to divide the thorax into two nearly equal portions. The head is almost triangular, with a rather deep excavation on the frontal margin; the posterior part of the head presents a strong emargination rising in an arch between the eyes, which last are large, prominent, rounded from above, reniform if seen at the side. Palpi elongated, conical, those of the maxillaries overarching the labial, approximated near their tips, and apparently of four joints, of which the first is by far the thickest, the last cuneiform. This *Paussus* with its congeners is surely misplaced, and erroneously classed with the *Tetrameræ*, for the joints in all the tarsi are visibly five, and may be readily distinguished with the naked eye.

Note.—It struck me that of the three I captured last night, one crepitated, or made an explosion similar to that produced by the *Brachini*, and most certainly while I now write my finger and thumb bear marks, as of caustic or something like it, though I assuredly have not used any thing of the kind for many months past. We have had very heavy rain for the last eight days; yesterday was the first fine day we have had since the rain set in, which may account for my great good fortune in capturing so many as three of these highly curious insects, all of which by the bye came in late, for it was near one A. M. before I got to bed.

Note Book.—*Sultanpore, Benares, June 22, 1840.*—Captured another *Paussus* similar to the three taken on the 21st instant, but it unfortunately fell into the oil of the lamp, and was killed before I could try its crepitating powers, which I more regret, as it is quite uncertain when I may again procure a specimen. I have already noticed that we have had very heavy rain for several days past, and insects both last night and on that of the 21st were more numerous than I ever remember to have seen before. A lamp I placed outside for the purpose of attracting them to its light, was after a minute or so, extinguished by the immense numbers which flitted about it, and to save the wanton destruction of life, I was compelled to cover the lamp with a wire shade at the expense of much light. As for myself, I could scarcely remain near the spot, though covered from head to foot with a black blanket; even with this precaution, my hair and clothes were so covered by the myriads which swarmed around the light, and caused me so much annoyance by getting under my dress, that I was forced to

make a virtue of necessity, and strip myself to a pair of light trowsers and white night cap, but for which I considered myself amply repaid in the capture of many new, and to me rare, specimens. Among the most common were several varieties of Carabus, four entirely new to me, Hegeter, Tenebrio, Agieliæ, and swarms of minute Capridæ. Of the rarer sorts I took two new Cicindelæ, two Colymbetes and very beautiful Halipus, which I had never before seen. All these came around the light in numbers, but Staphylini and the smaller Orthopterous insects were incredibly numerous. I was almost black with them, and the sensation produced over my back, arms and legs, from the multitude of grasshoppers and crickets which were constantly jumping on or off me, and crawling in every direction, was very similar to what is called "needles and pins," or a "foot asleep." Great indeed was the enjoyment of a bathe with some dozens of ghurrahs filled with cold water, which I poured over my head before retiring to rest at one A. M. I should also mention, that on visiting the Commandant of my Regiment this morning, I found that he also had captured a Paussus last night, similar to those I have been lately taking, between the hours of nine and ten P. M., and rather strangely to say, his specimen had shared the same fate as my last, having fallen into the oil-burner on the table.

No. 4, *Fig. 4.*—*Sultanpore, Benares, July 24, 1841.*—This Paussus has already been figured in the 2d vol. of the Transactions of the Entomological Society, by W. W. Saunders, Esq., but as his drawing though highly characteristic, must (I conclude) have been taken from a dead specimen, perhaps a dried one, I have thought it worth while, if only for my own satisfaction, to make another delineation of it from a living specimen which I this morning captured, having succeeded in rescuing it without damage from the gripe of a small black ant, which in spite of its struggles was bearing it along with the utmost facility, holding on by one of its antennæ. Length seven-twentieths of an inch. The head is rounded posteriorly and sunk into the thorax. A deep cavity with edges in the form of a horse-shoe, the anterior margins of which are levelled towards the front, is a prominent feature in this organ. The bevelments terminate at the front just above the forehead, at which spot they turn upwards a little, and appear to spread out in the form of a rather deeply emarginated clypeus. In the centre of this excavation are two

minute vesicles, resembling the eyes on the anterior extremity of the scorpion, of a resinous color and lustre. The antennæ are composed of two joints, the last very large, somewhat irregular, approaching in form to navicular. The edges of the upper margin present the appearance of a screw, both edges meet posteriorly, and form a slightly recurved spine projecting from the basal internal angle. The club when viewed at the side, resembles a butcher's cleaver. The thorax has its upper portion cardiform, and appears as if fitted into a cavity of the lower part, which latter also presents a crenulated edging extending the whole breadth of its centre. The margins of the thorax, head, and particularly the screw-formed edging of the antennæ, appear translucent, and in color very much resemble shell lac. The eye is kidney-shaped, but appears round when viewed from above. The palpi are short, and not very salient. The abdomen is turned and gibbous near the cloaca, and its extremity is furnished with two large bundles or brushes of densely set golden colored hairs, having also a vitreous appearance, and which are only rendered distinguishable by being disturbed with the point of a pin or such like implement; these hairs I found so very closely arranged, that even with my greatest care in trying to separate them, I never once succeeded in singling out a fibre: they always remained in bundles, or in the form of a moistened painting brush. I must not omit to state, that the character of this curious appendage was (I believe) first made known to the world by W. W. Saunders, Esq.; at all events my observations on it were induced from what I read in his account of this *Paussus*, published in the 2nd vol. of *Entomological Transactions*.

The elytra which are black, with their anterior and posterior margins of a pinkish brown, have their surface closely covered with silvery hairs, and near their posterior external margins the curious folicle I have already observed in No. 3, is very apparent. The abdomen is of a dirty yellow or Isabella color, approaching to light umber, and near the penultimate segment beneath, there are a pair of spines which curve slightly outwards, for what intent and purpose I cannot conjecture. Breadth of elytra and abdomen equal throughout. Tarsi evidently of five joints, the last longest.

Note.—I tried all I could to induce this specimen to crepitate, without success. Probably its battery had been expended in its struggles

with the ant, from which I captured it. On being touched, it would immediately simulate death, and remain with contracted legs for many minutes at the bottom of the tumbler in which it was placed. The second day becoming more and more lethargic, and fearing its death might ensue, I plunged it into hot-water, at which moment the abdomen became very much distended and glabrous; but this was the nearest sign I could perceive of any approximation to the Brachini.

No. 5, Fig 5.—*Sultanpore, Benares, August 17, 1841.*—I this day captured the Paussus delineated as No. 5, which I however consider to be of the same species as No. 4, but differing in sex. On being captured, it immediately emitted two loud and very distinct crepitations accompanied with a sensation of heat, and attended by a strong acidulous scent. It left a dark-colored stain on the fingers resembling that produced by caustic, and which had a strong odour, something like nitric acid. A circumstance so remarkable induced me to determine its truth, for which purpose I kept it alive till the next morning, and in order to certify myself of the fact, the following experiments were resorted to. Having prepared some test paper by coloring it with a few petals of a deep red oleander, I gently turned the Paussus over it, and immediately placed my finger on the insect, at which time I distinctly heard a crepitation, which was repeated in a few seconds on the pressure being renewed, and each discharge was accompanied by a vapor, like steam, which was emitted to the distance of half an inch, and attended by a very strong and penetrating odour of nitric acid, in every respect (as far as I could judge) similar to that produced by many species of Brachini, I have frequently had opportunities of trying. On removing the Paussus from the paper, I found that a large spot was formed, near the place where the abdomen had been, and extending backwards for one-third of an inch. The paper appeared strongly corroded as if with caustic, the color of the spot being light brown, and totally distinct from the purple of the surrounding surface. Having repeated this experiment four times during the day with the same results, and being perfectly satisfied that I could not be mistaken, I proceeded to kill and set the specimen. On being thrown into boiling water, the abdomen swelled up and appeared like an inflated bladder, being very much distended, assuming the same appearance as that which is observable in Brachinus and other

allied genera, when they are similarly treated, and which I have had hundreds of opportunities of verifying. From these facts I presume, that there is a greater connexion between *Paussus Carabus* than is generally believed, and perhaps they might be removed with advantage to the vicinity of each other. It was only when I commenced setting my specimen for the cabinet, that I observed that it differed slightly from my No. 4. I may therefore give the description.

The principal points in which it differs are : first, in the thorax, the cremelations which cross its centre being more deeply sculptured and foliated ; secondly, the antennæ instead of leaving their upper margins in the form of a screw, are dentated, having four rather large scallops on each side, one between each tooth ; and lastly, the abdomen, though provided at its posterior extremity with the brushes noticed in No. 4, wants the spines beneath the abdomen, which latter organ instead of being of one breadth throughout, is narrowed as it approaches the thorax. In length it is the same, being 7-20th of an inch long, including the antennæ when placed at an angle with the body, and of the latter organs the last joint is the largest, of an irregular form, or nearly boat-shaped, with dentated margins above, which terminate at the posterior and superior angle in a tooth. The excavation on the head is very deep, at the bottom of which, the two vesicles similar to those noticed in No. 4 are very apparent, and highly resinous in lustre. The palpi are somewhat more salient, but at the same time more attenuate than in that insect. In its markings, there is also a strong resemblance, but the abdomen is slightly darker, and the pinkish brown patches at the posterior and anterior margins of the elytra are broader and better defined. I should notice, that in each experiment on the detonating power of this insect, I have used a different finger in giving the small degree of pressure required to induce its crepitating ; all of which have been well marked, but those of the last two trials are not quite so dark as the stain left on the three first, and I am anxious to see how long they will remain on my hands. Although I have for some time past suspected the fact, that the *Paussus* had the curious property observable in some of the *Carabici*, and which (I imagine) is believed to be inclusively attached to them, it was not till the capture of the present specimen that I determined to try the truth of my surmises. The present insect having been taken by a lady in com-

pany, who from the sensation she felt beneath the finger, concluded she had mistaken a small *Brachinus* for a *Paussus*, and the skin of which, bore evident marks of the disposition, I have been induced to make these experiments, and the results have been as above stated. Captured No. 5 at a quarter after nine P. M.

Note.—*August 29, 1841.*—All the marks off my right hand.

Note.—*September 3, 1841.*—I have now lost all the stains on the fingers of my left hand, which I received in the experiments performed on *Paussus*, No. 5, by which it appears, that those of the left hand have remained 18 days, or 6 days longer than those on the right. This is singular enough, and I can only attribute the loss of the marks so much earlier in the right hand fingers to attrition, and more constant use, as the stains left were certainly much deeper in the three first trials than in the latter ones, and where I used the first, second, and third fingers of my right hand respectively.

No. 6, Fig. 6.—*Sultanpore, Benares, September 5, 1841.*—This *Paussus* has the thorax somewhat similar to that part of No 1 which I captured at Mhow, but in other respects differs considerably. Length 6-20th of an inch. The antumæ are composed of two joints, of which the last is very large, and in the form of a wide-mouthed cornucopia, being attached to the first at its basal angle. The margins of the upper side are slightly crenulated, and the upper surface is rather deeply excavated, giving this part a cuspiform appearance. Anterior and posterior margins compressed, the latter produced into a blunt recurved tooth. The sides of the club are faintly striped with 6 grooved bands; the eye when seen from above appears round, of an irregular oval shape when viewed from the side. Head trigonal, depressed with a marginal excavation, but no groove on the upper part. The thorax appears as if composed of two portions, the anterior being angulated, and forming a rather sharp spine on each side, with its base inserted in the posterior part. This latter portion is crenulated, with the exterior margins produced and rounded; a sulcus in the form of a bracket crosses the centre. The elytra are black, broadly patched anteriorly with brownish sienna, the posterior margin has a faint undefined line of the same color, which blends into the general black of the wing cases. The follicles at the exterior margin of the elytra posteriorly are much produced, and close to them on each side is a very

curious moveable spine, slightly incurved, and projecting over the latter segment of the abdomen. Body beneath a bright chestnut; head, antennæ and thorax a livid brown; all the joints in the tarsi are simple, cylindrical, furnished with hairs beneath, and of five joints in each leg, the first small, the last longest.

Note.—Taken accidentally while sweeping in high grass with a net under a Munja clump, (*Saccharinum Munja*.) On withdrawing this insect from the net, it gave two very distinct explosions, leaving the ordinary black stain on my fingers, the abdomen also swelled very much when submitted to the hot-water process.

No. 7.—*Sultanpore, Benares, September 6, 1841.*—A very curious *Paussus*, length 6-20th of an inch. Antennæ of two joints, the last long, club-shaped and grooved all round, forming six divisions, which, however, I could not discover to be perfoliate. The first joint near the base beneath is furnished with a small curved spine, above which, near the club, is a minute oval excavation. Head hexagonal, irregular, somewhat gibbose; eyes not visible from above, rounded when seen at the side. Thorax cordiform, broadly truncated posteriorly, with two small depressions on each side. Abdomen cylindrical, or shaped like a tub, palpi small, salient, the labial ones being over-arched by those of the maxillaries. No follicle observable on elytra. Tarsi of five joints, all simple, the first exceedingly minute. The coloring in this insect is peculiar; the last three divisions of the antennæ, and lower half of the elytra, are blue black. The head, antennæ, thorax, abdomen, and upper portion of the elytra, a bright light sienna. The legs and tarsi chestnut.

Note.—Found crawling up the wall of my bathing room. On being plunged into hot-water, the abdomen became greatly distended; but I observed no crepitation at this moment, or at the time of capture.

No. 8, Fig. 8.—*Almorah, July 29, 1842.*—Genus *Paussus*, length 9-20th of an inch. Head gibbous, strongly excavated both anteriorly and posteriorly, exserted from the thorax, the neck appearing very long. Antennæ of two joints, the last long, shaped like a peas-cod and bearing a small recurved tooth near 'the base of the upper' margin, edges compressed, and forming a carina on each side. Thorax cordiform, broadly truncated posteriorly, with the lateral margins produced: a sulcus in the form of a crescent runs across the thorax near its

centre. Elytra slightly narrowed anteriorly, and when viewed through the microscope appearing smooth, with diminutive frettings running in irregular lines down each; these are blue black, with a line of brown extending along the sutural margin, and a shading of the same color obtains both anteriorly and posteriorly. Head, thorax, and body chestnut brown; tarsi of five joints, the first small. Palpi rather large, salient, those of the maxillaries in particular. Eyes almost oval, but still uniform. Follicle on the elytra very apparent.

Note.—On capturing this insect which came in towards the light on the table some time after gun-fire, last night, I distinctly heard two strong crepitations, and my fingers were deeply stained with a brownish black color, and I accordingly reserved it for further trials, but unfortunately it appeared so weak this morning, that I was after ineffectual attempts to induce crepitation, obliged to postpone my experiments to a future date. On being killed with hot-water, the abdomen however shewed the usual sign, becoming greatly inflated.

Almorah, July 30, 1842.—I have indeed been fortunate in capturing the same species of *Paussus* as that of the 29th instant, and which was taken under precisely similar circumstances, having come to the lights at about 10 P. M. The crepitation on its capture was loud and very distinct, so much so, as to be heard by the company at table, and certainly equal to that of most of the small *Brachini*. I therefore tested its powers this morning again, having prepared some post paper with the petals of a deep colored *Dalilia*. I went through the old trial. The insect being carefully turned over it, I attempted its seizure, and as expected, a loud explosion was given, accompanied with vapor, and a strong scent of nitric acid. (I have the pleasure to transmit the paper on which the experiments were tried which bears two distinct marks, having only tested this insect twice.)*

I now proceeded to examine the foliaceous appendage on the elytra through the microscope, and I found that when the part was touched, an emission immediately took place from the spot, which spread so instantaneously over that part, that I could not observe exactly whence it originated. The appearance of the liquid resembled pus, which in a second or two granulated (if I may so term it) into egg-shaped grains, of which no traces remained after a lapse of a minute.

* We have not received this.—EDS.

I tried each elytron twice with precisely the same results ; during each emission a faint acidulous odour prevailed, and the part being touched with my finger, imparted that scent in rather a stronger degree to it. Having taken a drawing of the insect, I directed my servant to remove the microscope to another table, and in so doing, he unfortunately dropped the specimen, and has thus brought my experiment to a close.

Should the foregoing observations be considered worthy of publication, I shall be happy to transmit further extracts from my Note Book as occasion may present, or apply myself to any other point of utility in which my services may be deemed acceptable.

I also take this opportunity of enclosing the copy of a very magnificent species of *Scarabeus*, which I was so fortunate as to capture a few days since. The form appears familiar to me, and I fear may not be new to science ; but having no means of referring to books on the subject myself, perhaps you can supply the required information ; at all events, as it strikes me to resemble the general form assumed by the equatorial *Scarabæi*, it will be interesting to know that this insect was captured at an elevation of near 9,000 feet above the level of the sea, having been taken on the summit of the Gogur range in Kumaon, and was found feeding on the leaves of a tree unknown to me, but which I believe to be a species of *Maple*. Length three inches, weight one ounce, head and thorax a jet glossy black, the former furnished with a large recurved horn in the form of a sickle, compressed at the base. The thorax presents four protuberances, two above and two on the anterior margins. Scutellum black, elytra light chesnut brown, abdomen and legs deep chocolate. The maxillaries curiously dentated at their apices, and furnished with hairs. Maxillary palpi of four joints, the last spindle-shaped and longest, the first conical and smaller than the second. Mandibles, which are corneous and squared, jut out considerably beyond the sides of the head ; they are also thickly set with hairs, both on the internal and external sides, labial palpi very small. Antennæ of ten joints, the first conical, the next three nearly round ; the club is composed of three leaflet joints, and the intervening ones are nearly cuspidiform, the tarsi are simple, of five joints, the last much produced. Hooks nearly equal in length, and furnished beneath with a stiff seta, which near its apex is split into a brush-like form. Taken August 17, 1842, above Budlakhote, Kumaon. The drawing is taken of the natural size.

Fig: 1

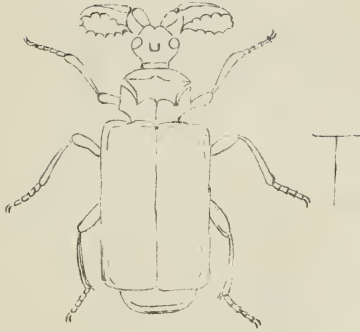


Fig: 2

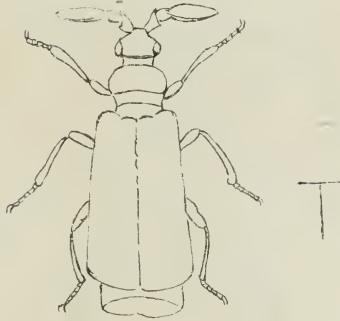


Fig: 3

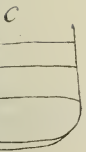
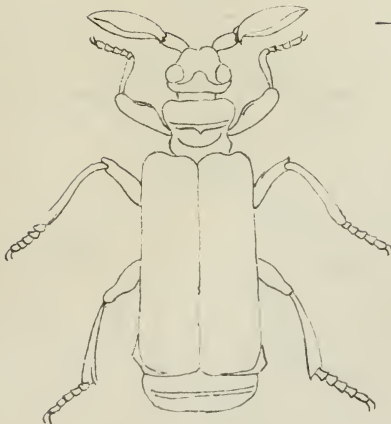


Fig: 4

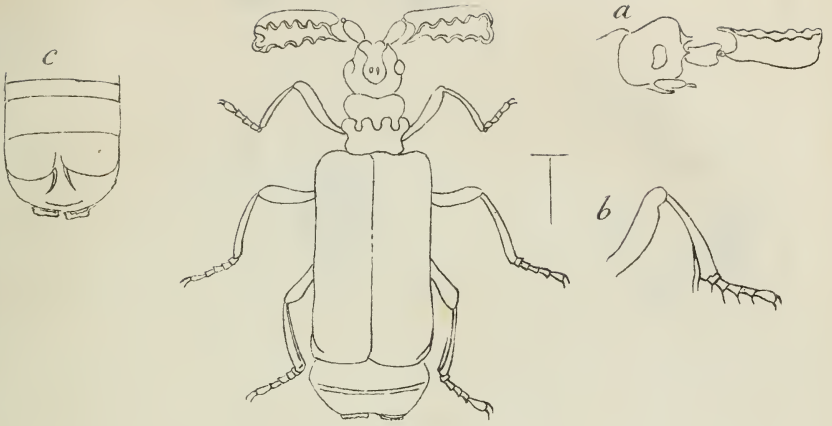


Fig: 5

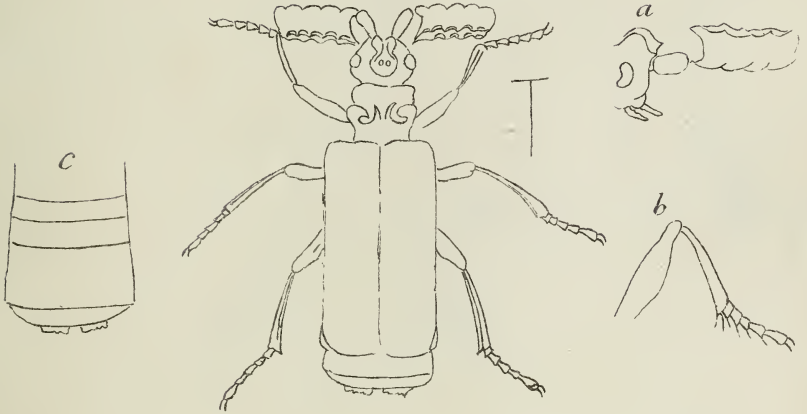


Fig: 6

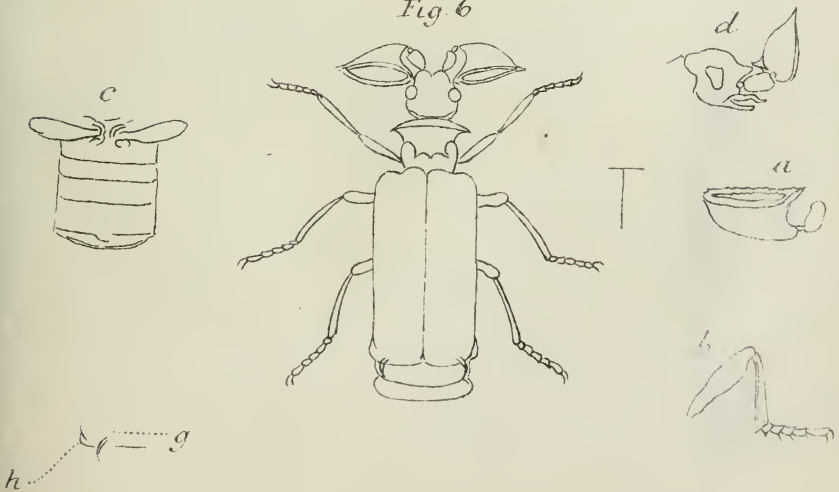


Fig 7

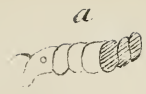
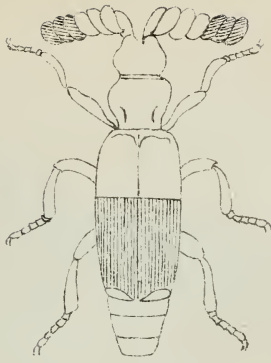
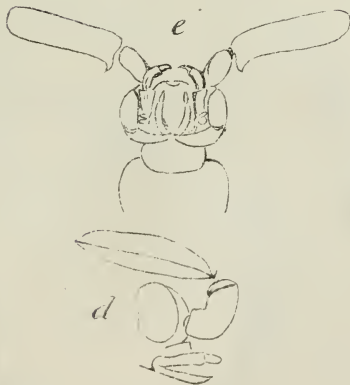
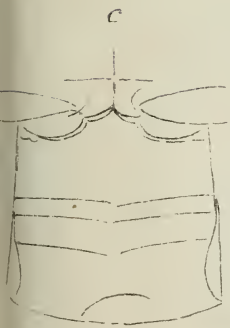
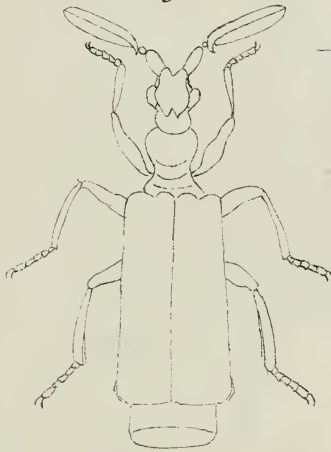
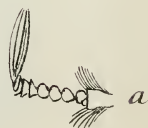
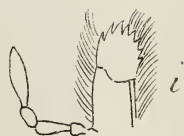
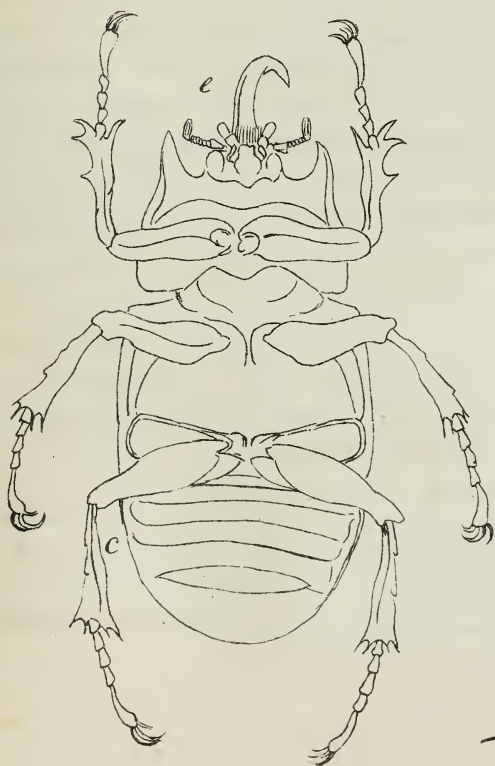


Fig 8





The accompanying letters refer to the sketches of the Paussi equally with the Scarabeus: *a*, antennæ; *b*, posterior tarsus; *c*, abdomen; *d*, side view of head; *e*, inferior view of head; *f*, underwing; *g*, spine of elytra; *h*, folicle or elytra; *i*, maxillary palpus and maxillar.

Almorah, September 16, 1842.

Memorandum on the construction of a Portable Meridian. By E. C.

RAVENSHAW, Esq., B. C. S.

1st. Those who have visited the Cathedral of Florence, or the Church of Saint Petronio at Bologna, may recollect having observed a straight line running down the whole length of the aisle, and a small round hole in the wall of the building, about fifty or sixty feet above the level of the pavement. A traveller who should enter either of the said churches about noon, would not fail to be struck by the mysterious conduct of those about him; a dozen watches of quaint forms and various sizes would be seen to spring suddenly from the fobs and waistcoat pockets of people as quaint and peculiar as their timepieces. Their eyes would be seen to be intently fixed on some object on the ground, and the traveller would naturally imagine that the toe-nail of a saint or a martyr was about to perform a miracle, the exact period of which it was as important to fix as that of the transit of Venus. On joining this interesting group, the traveller would find that the object of solicitude was a bright round spot caused by a ray of the sun passing through the aperture above mentioned, which is seen slowly approaching the line that runs down the centre of the aisle. This line is a meridian, and when the bright round spot arrives at, and is bisected by this line, the sun intimates to the spectators, that he has reached his meridian altitude. The watches are returned to their fobs, and voices are heard muttering in Italian, German, French, and English, either self-congratulations on the accuracy of their Breguets, or uncomplimentary remarks upon the artists who manufactured their watches.

2d. Imitations of these magnificent meridians are made on a small scale by individuals for private use; a wooden rod or pedestal, about a foot high, having an iron plate with a hole in the centre, fixed at right angles on the top of the pedestal, forms the substitute for the wall of the Cathedral; one of this description is (or was two years ago) to

be seen at a window in the house of the Catholic priest adjoining the Church at Bettiah in the Chumparun district. A French gentleman, (now Principal of the Dehli College,) acquainted me with the method of laying down the meridian line from the above instrument, and I have since then constructed several. All these meridians are of course fixtures, but it occurred to me, that if a portable one could be made, it would be extremely useful when travelling about the country in tents, and an excellent substitute for one of Dolland's Universal Dials. Though inferior to the latter in the circumstance of shewing only one hour in the day; viz. twelve o'clock, yet it would be superior in shewing that hour with an accuracy unattainable by the Universal Dial, owing to the variation of the compass by which the latter is always set. The variation of almost every needle differs considerably, so that a knowledge of the general or average variation of the compass at a particular place, does not afford any information as to the variation of the particular needle in your dial, and without ascertaining this point, no dependence can be placed on the time given by the dial. A variation of one degree makes a difference in time of

THEODOLITES.

<i>Instrument.</i>				
No.	4.	2° 38'	0"	Variation East,
	16.	2 21	0	January 1841
	12.	3 39	0	at Cuttack.
	21.	2 37	0	
	23.	2 49	0	These needles
	61.	2 33	18	not more than
	79.	2 17	32	3 inches long.
	76.	1 36	22	
	5.	1 26	0	

about five minutes, and the annexed memorandum, made by Lieut. Thuillier, (the Revenue Surveyor of Cuttack in 1841,) shews, that among a number of needles, all of the same length, some differ from others to the extent of 4°; supposing the latter to be the variation of the needle in an Universal Dial, there would be an error in the time of about 20 minutes.

PRISMATIC COMPASSES.

<i>Instrument.</i>				
No.	2.	1° 15'	0"	Variation East,
	3.	1 0	0	needles 2½
	4.	4 0	0	inches long.
	9.	2 15	0	
	34.	3 30	0	
	46.	1 45	0	
	36.	2 39	0	
	16.	3 30	0	
	119.	2 15	0	
	23.	1 15	0	
	22.	1 15	0	
	40.	3 45	0	
Compass	3.	2 0	0	
	12.	2 0	0	
	21.	1 38	15	
	17.	1 45	0	

3d. The Portable Meridian which I am about to describe, if accurately constructed by professional instrument-makers, such as Dolland, or Troughton and Simms, would give the time with much greater, if not perfect, accuracy, as it would be free from all errors arising from the variation of the compass. This instrument, shewing (or professing to shew) the true meridian, would also

enable any person, however unscientific, to determine the variation of any needle in a minute by mere inspection. The altitude of the sun or moon,* when on the meridian, can be read off with equal ease, and the latitude of any place ascertained with the aid of a Table of Declination pasted on the lid of the box. By fixing sights at each end of the meridian line, the instrument would serve for taking levels; and last, though not least, would enable Surveyors to lay down a long meridian line for the base of all their triangles, with much less difficulty than is experienced in many of the usual methods. Though simple and easy in theory, many of these methods are difficult in practice. They require that an officer, perhaps suddenly ordered out to make the survey of a district, should be in the possession of certain instruments and certain astronomical works, which are not always to be obtained. For instance, the most approved method of laying down a meridian is said to be by observations of equal altitudes of the Polestar; but without the Nautical Almanac for the year, which is not always to be obtained, it often requires nights of watching, and the patience of a Chaldean to catch the star in the small field of a Theodolite telescope at the precise moment necessary for the accuracy of the observation. The process by observation of the sun's azimuth is also I understand not free from difficulties. Under these circumstances it is hoped, that the simple instrument now submitted for consideration, (though it does not pretend to perfect accuracy,) may be occasionally found useful by the scientific as well as by the unscientific world. With these few explanatory remarks, I proceed to describe the instrument, a sketch of which accompanies this memorandum.

4th. A B C is a brass semicircular plate, about 2-10ths of an inch thick, with the degrees marked on the rim, which are counted from the point C. both to the right and left, D C being of course at right angles to A B. E F is a moveable radius turning on the point E, and having degrees of altitude marked on it, as shewn in M N. The mode of laying down the degrees by means of a graduated circle will be understood from the figure S T V; K L is a perpendicular flat rod having a small oblong plate L with a hole in the centre, fixed at right angles to K and parallel with the horizon. This rod KL is to be fixed at D† perpen-

* At night.

† As exemplified in the figure O P.

dicular to the brass semicircle A B C., so that the round hole L shall be immediately over the centre point E. I I I are elevating screws by means of which the instrument is first to be accurately levelled. This may be done either by placing a common spirit level on the brass plate, or by having two small spirit levels at right angles to each other let into the plate.

5th. *To find the meridian line*, place the instrument or rather the line E C due north and south by any compass, C being the north point and E the south, at any time (say an hour) before noon* the sun will be observed to shine through the hole L, throwing a bright round spot on the left side of the plate near one of the circles a, † a, a; wait till the spot comes on the circle, say at G, and mark the point with a pencil. Then move the right side of the radius E F up to it, and read off the number of degrees, say 50° on the rim of the plate. The sun after crossing the circle at G will proceed along the dotted line until it reaches the other side of the circle at H, where it will arrive about an hour after noon; mark the point as before and read off the number of degrees, say 30° , add them to the number noted above (50°), the result will be 80° . Divide by 2, which gives 40° , or the bisection of the arch G H, move the radius to the point of the rim marked 10° , which is half way (or $40^{\circ}\ddagger$) between the extreme points G and H. The direction of the radius as now placed will be that of the true meridian, being the bisection of the arch G H, described by the sun himself, (the great *Archimedes*) at equal altitudes.§ The instrument having been originally set to the magnetic meridian, the distance between the line E C and the radius E F; viz. 10° , is the variation east of the compass with which the instrument was set. It is evident that the variation of any other compass may be ascertained in the same manner, or by placing the needle with its own graduated circle on the meridian line E F.||

* Two hours would be better if the sun is very high.

† Any number of circles may be drawn, six or eight are necessary to suit different times of the year.

‡ Either the line M N, or the right side of the radius will answer if placed opposite 10° , but the former is best.

§ The difference in the sun's declination in two or even four hours is so slight, that it would not cause an error in the position of the meridian of more than a few seconds, it is unnecessary therefore to apply the equation of equal altitudes.

|| Where great accuracy is required, and the needles are long, the observation should be made either at 10 A. M. or 10 P. M. as the needle moves slowly west in the forenoon, returns to its mean position about 10 P. M. then deviates to the east, and returns at 10 A. M. like the barometer.

6th. *To find apparent Noon*, the instrument must remain in the same position until next day, and when the luminous round spot occasioned by the sun shining through the aperture L falls on the centre line M N of the radius, the sun is at its meridian, and shews apparent noon. By adding or subtracting the equation of time for the day of the month, the mean time, which a watch or clock ought to keep, will be ascertained.

7th. *To find the altitude* it is only necessary to mark the point on the radius where the sun crosses it, and read off the altitude.*

8th. *To find the latitude*, deduct the observed angle from 90° , and add the result to the declination if north. If the declination be south, add it to 90° , and deduct the observed angle. At the equinox, the observed angle deducted from 90° gives the latitude.

9th. *In order to lay down a meridian line* for survey purposes, fix the sight R on to the rim of the instrument opposite the rod o, as shewn in the figure O P. Look through the two corresponding apertures (which are exactly on a level with each other) at a pole erected at some distance in the line of sight. Then move round and look through the sight P in the opposite direction at another pole erected to the south in the line of sight, cut a line on the ground connecting the two poles, and your meridian is complete.

10th. I have constructed a small instrument of this description, the diameter of which A B is $9\frac{1}{2}$ inches, and the height of the pedestal or gnomon 2 inches. It is made entirely of brass, and the degrees on the rim have been marked off with great accuracy by a native mistry. The cost of the materials is not more than two rupees. The labour, however, is considerable, and the man asked sixteen rupees for the whole, including his own remuneration. This, however, is cheap compared with one of Dolland's Universal Dials, $4\frac{1}{2}$ inches in diameter, which in Calcutta costs eighty rupees.

11th. Lest a scientific instrument contrived by an unprofessional individual, should be received with doubt or hesitation, I have annexed to this memorandum extracts from two notes from the professional Surveyor of Patna, giving his opinion on the accuracy and utility of the instrument, which I hope will be thought satisfactory. The principle

* If the moon should pass the meridian at night, its altitude and the time may be ascertained in the same manner.

of it was also approved by Lieutenant Thuillier, the Revenue Surveyor of Sylhet, who was in temporary charge of the Patna Survey, during the absence of Lieutenant Maxwell.

Extract of a letter from Lieut. Maxwell, Revenue Surveyor.

I hope the following will be satisfactory to you, and will prove to the world, that the little instrument deserves the name you have given it. I send exactly what I did, and assure you that I have not attempted to force the observations into good ones, they are all *bona fide* ones.

On the 27th, the morning observation was	70 50	
Evening,	63 00	
	7 50	
	3 55	Var. of needle.
,, ,, 28th, the morning observation was	71 30	
Evening,	63 30	
	8 00	
	4 00	Var. of needle.

I placed two poles on the line (radius when set to the 4°), and the following angular observation from my meridian line, (whose bearing is 352° 59'), gives a capital result.

The true bearing of line A B is 352° 59'.

\angle A B C. = 41° 34' ∴ bearing of line B C is 214° 33.

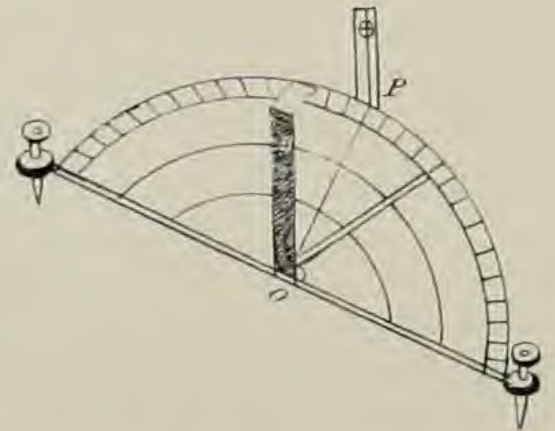
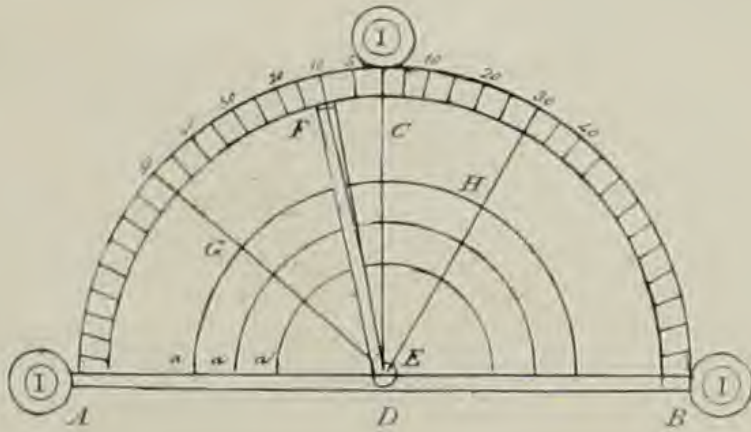
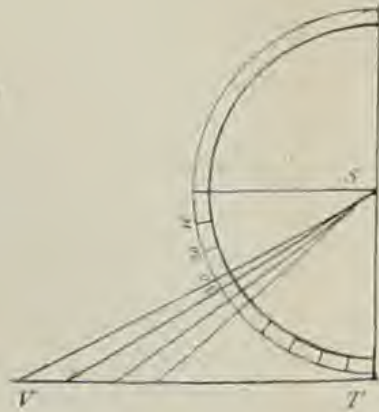
Interior \angle B C D. = 325° 22' ∴ bearing of line C D is 369° 55'.

Line C D is set by your little instrument at 350° 00' ∴ the difference is 5'. Considering the difficulty of seeing through the sights, you will perhaps agree with me in thinking the result most satisfactory. There is no doubt whatever, that if an instrument like yours were made with a rack and pinion and divided to minutes, that the utmost accuracy would be obtained.

Extract from another letter from Lieut. Maxwell, Revenue Surveyor.

It is indeed an excellent "*hikmut*;"* its great beauty is its simplicity, for the most ignorant can use it, and I can with great confidence state,

* "Contrivance."



RAVENSHAW'S PORTABLE MERIDIAN.

AND

Universal Noon-Dial

Printed and Sold by W. B. ...

that two or three of them made by Captain Boileau, the instrument maker in Calcutta, would be a great acquisition in a survey where the European assistants in general know no more about checking a meridian line, or giving the latitude of their camps, than the man in the moon.

Descriptive list of some Coins lately received from the University of Christiana by the Asiatic Society. By DR. E. ROER, Librarian. Asiatic Society.

To H. TORRENS, ESQ. *Secretary, Asiatic Society.*

SIR,—I beg to forward to you a descriptive list of the coins, which we have lately received from the liberality of the University of Christiana.

They consist of coins of some of the Danish kings of the Oldenburg dynasty, and of a most valuable collection of coins of the 12th century, especially Norwegian, forming a part of those coins which one Anders Anderson accidentally discovered under a large heap of stones on an uncultivated spot of his estate at Daelie in the province of Hedemarken in Denmark. Having delivered a part of them, of the weight of forty ounces, to the Magistrate, he afterwards sold to the University of Christiana 5000 coins of the weight of $13\frac{1}{2}$ ounces, for the same weight of unmanufactured silver.

I take this opportunity of offering a few notices on the antient coins of Norway, for the materials of which I am indebted to the following dissertations of Mr. Holmböe, Professor at the University of Christiana:

1. De prisca re monetaria Norvegiae et de numis saeculi 12mi nuper repertis. Christianiae, 1841.
 2. Descriptio ornamentorum, maximam partem aureorum, et numorum saeculi 8vi et 9ni. Christianiae, 1835.
 3. De numis MD medii aevi, in Norvegia nuper repertis, 1837.
- they I hope, will be of some interest for the numismatic members of the Society; and the more so, as according to a remark of Mr. Holmböe, the numismatics of Norway were for a long time not sufficiently explored. This arose from the rarity of antient Norwegian coins, as

well as from the scanty notices given by the historiographers of the middle ages on numismatic subjects. The obscurity shrouding those remote ages had been partly dispelled in the course of the last fifty years by a great number of coins, dug out of the earth, or found in the foundations of some antient churches, which had been destroyed by various causes. Still the links were wanting to connect the coins of the 11th century with those of the 13th, which are now amply afforded by the coins found at Daelie.

The Norwegians used, as most nations did, the same term for money and cattle. The Norwegian word "Fe" signifies cattle and money, and "penningi" does not only denote the species of coins known under that name, but money in general.* In like manner, in accordance with other nations which fixed the value of things by metals, they weighed the metal before they had coins.† The antient weights of Norway are the following :—

1 Marca (mörk)	=	8 Orae, (aurar)‡
1 Ora (eyrir)	=	8 "Ortugae, (ortugar.)
1 "Ortuga	=	10 Denarii, (penningar.)

The gold, used for weighing, was extended into a kind of wire in the shape of a ring, either simple or of many folds (called bagr or bauger,) which at a sale was weighed off entirely, or in pieces. The silver as a means of exchange was used in a similar manner, having sometimes the shape of a solid mass; sometimes of a ring; sometimes trinkets were also applied to the same purpose, till foreign coins are at last observed, especially Anglo-Saxon and German, of which a great many are found in Norway.

* Clarke (on the connexion of the Roman, Saxon and English coins, p. 390) gives another derivation of this word which at first sight seems highly probable; that penning (evidently the same with the Norwegian word) was formed from the Latin pendo, and was sometimes written more agreeably to this origin "pending," and both expressions were derived from the antient and universal custom of paying by weight; but this appears rather an accidental coincidence, as the Saxon word is the same with the Norwegian and German, and in the latter language, the term penning obviously shews its origin from the word in use for cattle.

† The Hebrew word שקל originally denotes to weigh; thus talentum and libra signify a balance. The principal gold and silver coins among the Greeks were called staters, which is taken ἀπο της ζατικης from the scale. Thus in Rome, all payments were made per aes et libram.

‡ The terms marks and oras were first used by the Goths, and ora, which is corrupted from the Latin word "aureus" is synonymous with solidus.—Clarke, l. c. p. 310.

Copper was very rarely used as a means of exchange, and we may notice, that during this whole period no gold or copper coins were used in Norway, unless we should refer to the latter, the silver coins of the end of the 13th century, with which a large portion of copper was mixed. The price of the gold was about the 10th century eight times higher than that of silver, which proportion seems to have obtained throughout the whole of Europe during that period.

The greater part of the ornaments dug out of the earth are made of pure gold and silver, and it is even recorded in antient histories, (Sögur,) that the silver was cooked (brent silfr.) It may be here noticed as a curious fact, that many nations of no connexion whatever, and at most different periods, have adopted gold rings of the above described shape as the first equivalent of the price of things. Thus it is said of Gideon, that after his victory over the Ismaelites, he took from them a great number of gold rings, and Job received such rings from his friends. They are represented on the antient monuments of Egypt, are sometimes dug out of the earth in Ireland, Norway, Sweden and Denmark, and are still in use in Abyssinia and Guinea.

It is not quite certain which king of Norway first struck coins, though it appears probable, that it was not done previously to Hakim the Good,* (A. D. 938-963.) Of the coins of Hakim's successors, we know only one of Olav. Tryggveson (995-1000), one or two of Count Eric (1000-1016), one of Magnus the Good (1035-1047), and one of Harold Hardrade (1074-1067), while in antient chronicles we find no mention of Norwegian coins before Harold, of whom they state the particular circumstance, that eight days after the celebration of Christmas, he distributed some money to his soldiers, which according to the same authorities were called Harold slata, (struck by Harold), and for the greater part consisted of copper. The art of coining seems to

* In the year 1834 a great variety of ornaments and of Byzantine, Arabic, Franco-Gallic and Anglo-Saxon coins of the 8th and 9th centuries were found in Norway, and from the fact, that no Scandinavian coins were among them, we may conclude, that at the period, when those things were used as ornaments, that is, in the 8th and 9th centuries, no Scandinavian coins were struck. It therefore becomes probable, that this was not done before the middle of the 10th century. The most antient Norwegian coins as yet discovered, are those of a Hakim; but as two kings of his name have reigned in that century, Hakim the Good and Hakim the Bad, who lived about the end of the 10th century, it is doubtful to whom we are to assign them.

have been earlier introduced into Norway, than into Sweden or Denmark ; for the most antient coins of Sweden are those of Olaus Skotkonung (993-1024), and of Denmark those of Sveno Tueskjaeg (991-1019), on the coins of whom the name of the same mint-master is inscribed as the coins of Olav Tryggveson (995-1000); but in Norway coins were already struck under the reign of Hakim the Good or the Bad, which latter reigned between 978-995.

No coin, exceeding the value of a denar, seems to have been struck in Norway from the commencement of their coinage to at least the first years of the 13th century, and this sort of money apparently was then most common all over Europe. The shape of the types was usulaly borrowed from English coins, and the first coiners are evidently from England. Godvine at least, who towards the close of the 10th century superintended the mints of the kings of Norway, Sweden and Denmark, bears an Anglo-Saxon name, and Ulf, the mint-master of Harold Hardrade, inserted the preposition "on" on the Norwegian coins. The obverse of these coins accordingly represented the bust or the head of the king together with his title and name, while the reverse contained a cross and the name of the mint-master, or the town, or of both in the Latin language. I may here notice, that with regard to the antient coins of Norway, the same observation obtains as to those of England. The more antient they are the better is their execution, as the remains of Roman art in the earlier centuries of our era were more and more overgrown by fresh influxes of barbarians. In the period we allude to, only a few traces of the Roman way of striking coins had remained, and still these coins are much superior to those of the 12th century.

Beside the coins bearing types on either side, a large number of small, thin, and hollow coins were struck in Norway at that period, which were called *bracteato* (from *bractea*, a thin leaf.) It is, according to Mr. Holmböe, a common error to ascribe these coins at an earlier period to Scandinavia than to Germany, as on a careful examination it appears, that no coin of this shape can be assigned to Norway previously to the middle of the 12th century, while the Germans used them already in the 11th century.

The collection, presented to the Society, consists almost entirely of such *bracteati*, or hollow coins. They are very thin and brittle, and the

obverse only has a sign, generally representing a single letter, or a cross of various shape, or any other simple device, while the reverse shews the hollow impression of the same. Some of these devices are accompanied by one or more points variously distributed, and surrounded by two or more circles, which are either plain, or formed of a series of globules. I must not omit here to mention a remark of Clarke (l. c. p. 23) that the cross upon Anglo-Saxon coins, and in the Norman reign is said to have been deeply impressed, that the coins might be divided into halves, &c.

In conclusion, I would notice, that the coins bearing the device of a spiral line and of three concentric circles with a point in the centre are believed to belong to Sigurd, Eistein and Ingo (1142-1155) V. list No. 41-44, those with the letters M. and R. to Magnus the son of Erlin (1161-1184) No. 14-17, and those with the letter G to Guttermus (1204) Nos. 10-12.

E. ROER.

Additions to the Catalogue of Nepál Birds. By B. H. HODGSON, ESQ.

1. *Merulinæ. Grandala, Mihi* (new).

Bill medial, slender, straight, *Phœnicuran*, but the base rather more depressed and more excided by the nareal fosse and gular flap.

Nares oval, lateral, free, placed at the fore-end of a largish fosse, and shaded above by a small process of its membrane. Gape smooth.

Wings very ample and firm: the first quill bastard, second longest; tertials hardly above half the length of the primaries.

Legs and feet simple, ambulatory, slender and delicate in all their proportions.

Tail medial, firm, forked.

Type. *Gr. côlicolar* (new). The male throughout black internally, but the whole body and head glistening externally with brilliant small-blue: bill and feet jet-black: iris dark. Female sordid slaty, or blue-black with a brown smear, alars and caudals darker: a white bar through the wing: body striped down the shafts with luteous-white: bill and legs uniform black. Total length 9 inches, of bill to gape 13-16 inches; to brow 9-16 inches; tail $3\frac{3}{4}$ inches; closed wing 6 inches,

tarse to sole $1\frac{1}{8}$ inch, central toe and nail, 15-16 inches, hind toe and nail 10-14 inches: female smaller, being about 8 inches in total length.

Habitat, the northern region or Cachâr, in under-spots near snows: solitary: insects and gravel in the stomach.

Remark: a singular bird, having the general structure of a Thrush, but with the wings vastly augmented in size and the bill of a Sylvian. Analogous to *Grallinæ*?*

2. *Crateropodinæ*? *Heteromorpha*, † Mihi.

Bill short, stout, compressed, hard, blunt, entire, as high at the base as long, and much concealed by the frontal plumes; ridges great, curved, and broad; sides flat: tomixæ even: tips equal and obtuse.

Nares small, round, remote, having a raised rim, and concealed by incumbent setaceous plumules. Rictus narrow, furnished in both mandibles with slenderish bristles.

Wings submedial, feeble, bowed, narrow, sixth quill longest; four first much graduated; first plus half of longest: tertials evanescent.

Tail largish, graduated, firm; the separate plumes wedged at their tips.

Legs and feet very stout: the tarsi elevate, with large scales across front-half, and postæal half smooth and sharp. Digits shortish, flattened on soles, basally connected, especially the outer one: the inner fore-toe as long as the outer and stouter; the central not elongated; the hind as long as the lateral fore-toe, stout and depressed. Nails large, moderately bent; sufficiently acute.

Plumage very soft and lax.

Type. *H.* [*Paradoxornis*, apud nos, E. B.,] *unicolor* (new). Throughout of an olive-brown colour, brightest on the fully crested head, and next on the alars and caudals: bill yellow: legs slaty-grey: iris brown.

* A specimen in nestling plumage has just been received from Mr. Hodgson, having the head, neck, interscapularies, and under-parts, marked with a pale central line to each feather. The bill of this individual is mutilated, but judging from the rest of its external structure, I agree with Mr. Hodgson in considering this remarkable bird much allied to the true Thrushes.—E. B.

† If the several new genera herein adverted to can be properly referred to the *Crateropodinæ*, that group would seem to contain representatives of all the tribes of Perchers, and perhaps should be broken up to be distributed among all of them. All the *Crateropons proper* might be referred to the Garruline group, for example.

Length (total) seven inches and three-quarters; of bill nine-sixteenths; of tail four and seven-eighths; of wing three and seven-sixteenths; of tarsus one and one-eighth; of central toe and nail seven-eighths; of hind ditto ditto three-quarters.

Habitat, the Cachâr: dwells in thick brushwood: frequently alights on the ground, but seems to feed aloft on bugs and other hard insects of trees: in small flocks: not noisy.

Remark: greatly allied to *Paradoxornis*, also to our *Temnoris* and *Conostoma* [*J. A. S.* Vol. X, p. 856]: differs from the first in the smooth level, unarmed and equal tops and tomia of the bill.*

3. *Temnoris*, olim *Suthora* (amended).

Bill very short and stout, as high and nearly as wide as long, with broad, greatly curved ridges and subtumid sides: tomia even: tips equal and truncate: base much and softly plumed. Rictus smooth. Nares small, round, hidden by a soft frontal zone.

Wings short, rounded, much graduated, yet firm, and tending to a point: 6th primary longest; 5th and 7th hardly less; the two first much, and the two next less, graduated; 1st half the length of longest. Tail longish, much graduated, simple and feeble.

Tarsi strong, elevate, smooth. Toes short, flattish below; unequal: the exterior fore longer and basally connected, the inner fore less,

* I have considerable doubts whether, on actual comparison of specimens (especially if recent), this form will prove to be separable from *Paradoxornis*. The *P. flavirostris*, Gould, (apud Horsfield,) was obtained by Dr. McClelland in Assam, and was described by him, under the supposition that it was new, as *Bathyrrhynchus brevirostris* in the 'India Review' for 1838, p. 513, and a rough figure given of it. In that description it is stated that the mandibles "meet in an obtuse point in front without a hook;" and in my *P. ruficeps* (*J. A. S.* XI, 177), which in other respects essentially accords with the generic diagnosis of Mr. Hodgson's *Heteromorpha*, the impending of the upper mandible (so far as can be made out from the dry specimen) is in the most trifling possible degree, which, from recollection, I think is also the case in *P. flavirostris*. Mr. Hodgson, at page 563 of the same volume of the 'India Review,' identified McClelland's *Bathyrrhynchus* with his own *Suthora* (since named by him *Temnoris*), and even suspected that his typical species, or *Nipalensis*, might be the same as Dr. McClelland's *brevirostris*: but the description and figure which are now furnished by Mr. Hodgson of his *Temnoris Nipalensis* indicate the very inferior size of the latter species, to say nothing of other distinctions, amounting, however, at most, in my opinion, to subgeneric. We have, accordingly, four species now ascertained of this remarkable group, of which three are probably new to Ornithologists in Europe. The diminutive *Temnoris* has recently been received by the Society from Darjeeling. —*Cur. As. Soc.*—Mr. Hodgson has just forwarded a specimen of his *Heteromorpha*, and I consider it to be a true *Paradoxornis*.—*Ibid.*

and freer at base; hind stout, depressed, equal to the inner fore-toe. Nails compressed, deep, acute, *Parian*, but less suited for creeping.

Plumage soft and lax.

Type. *T. Nipalensis* (see 'India Review' [for 1838, p. 32], Habitat) the Cachâr, in small flocks; frequenting brushwood and tall grass: manners of *Parus*, of which it has the entire aspect; but besides its truncated bill it differs by rounder wings and larger and less arboreal legs and feet. Is greatly allied by its strange bill to the last.

4. *Ampelidæ, Prosorinia*, olim *Cochoa* (amended).

Bill moderate, Thrush-like, but much more depressed and greatly excided at base by nareal and gular cavities, and both tips armed.

Nares large, ovoid, free, lateral, and typical. Rictus wide, with short curling bristles which partly tend over the nostrils.

Wings medial, firm; *Turdine*, but rather less acuminate, with the fourth primary longest. Tail firm, rounded.

Legs and feet simple, ambulatory, *Turdine*, but the tarsi shorter though not less strong, and thumbs longer.

Types. *Pr. viridis* et *purpurea* (see *Journ. As. Soc.* V, 359.)

Remark: with the size, aspect, and manners of Thrushes, these birds are typically *Ampeline* in structure, and should stand next to *Casmarrynchus*. Both species are amply crested, and have subnude orbits.*

* The Society has received several specimens from Darjeeling approaching closely to the description of *Pr. purpurea*, but they would seem to be less bright in colour, certainly than the figure given, and have not the tail-feathers similarly pointed. *Vide* my description of a Darjeeling male, Vol. XI, p. 182.—*Cur. As. Soc.* A female has more recently been received by the Society from Mr. Hodgson, and they are the same. *Pr. viridis* I have not seen.—*Ibid.*



Merulinæ

Grandala schistacea, type.
two thirds natural size

Reynolds del

Black & White lith. No. 1



Heteromorpha Unicolor type
natural size

J. Bennett del



J. Bennett del.

T. Black lith.

Temnoris Nepalensis type.
Size of nature.





Ampelice
Proserpinca purpurea type
2-3/4ths Nat Size.

T. Bluch Asiatic Libb Press

J. Bennett del



On an improved Simpiesometer, "The Tropical Tempest Simpiesometer," just received in Calcutta. By H. PIDDINGTON, Sub-Secretary, Asiatic Society, &c.

The following Notes were by the kindness of Mr. Lepage, of the firm of Ostell and Lepage, Booksellers of this city, handed to Mr. Simms, of the well-known firm of Troughton and Simms, with a request that they would try the experiment indicated, and manufacture an instrument for me with the improvements suggested. They have done so, and the instrument was exhibited at the August Meeting of the Asiatic Society.

There are two objections made to Simpiesometers. The first, that "they disquiet people needlessly," and the second, that "they get out of order." The first objection it is evident we cannot remedy, for it depends on individual character, on experience, on knowledge, and on many other personal or acquired peculiarities and qualities, over which we have no control. But with respect to the second defect, I think I can point out to the makers of these instruments, two principal sources of it; and these are, alterations in the chemical qualities of the oil, and the shortness of the tube. We cannot (yet) guard against any alteration of the oil, which might affect the gas; but *if* this occurs, it is probably through the chemical action of light upon the oil. I should suggest then, as an improvement, that the glass be covered with a metallic door, to open with a hinge, so that except when observed, the instrument would be in darkness, where pressure and temperature would operate quite as well as in the light, and the glass would be more-over less liable to break.

The next improvement is the main one, and is, I am convinced indispensable to the efficiency of *tropical* Simpiesometers; viz. instruments which are to be of use for any length of time between the tropics. If Messrs. ——— will refer to Colonel Reid's work on the Law of Storms, they will there see in the chapter on "Storms at the mouth of the Hooghly," p. 293 of 2d edition, that in 1833 in the *Duke of York's* Storm the Barometer fell below 26.50 at a temperature of 79°! and I am certain that in many storms it falls at least to 27.00, with a temperature of 80° or more.

Now if Messrs. ——— will try in their receiver the effect of reducing the pressure to 27.00, and keeping the temperature at 80 or 84°, for I have known it as high as this, I suspect they will find that the gas will escape round the curve of the leg, and bubble up through the cistern. In a word, the tube and scale are not long enough for tropical hurricane depressions; and when a ship gets through one of these, the Captain may not improbably find that his Simpiesometer does not act so well as before, and thus the

worst character which an instrument can get becomes (and really is) attached to it, *i. e.* that it is “*very liable to get out of order.*” The *Duke of York’s* Simpiesometer is still in Calcutta, but gives indications differing half an inch from the Barometer, as I have heard: one sent to me for trial gave regularly on an average 0.7 *above* the Barometer standard, and at 28.5 or 27.00 inches of pressure, with temperature 80°, would have been I think useless, or the gas would perhaps have escaped; hence, as I judge the universal complaints against Simpiesometers which have been long in use in tropical countries.

The remedy for this last defect is also simple enough, and if Messrs. — will try it, I shall be glad to assist them in making the improvement known in India, and especially in Calcutta. It consists in making the scale and tube long enough to leave at least half of an inch column of oil at pressure 26.00 and temp. 84°, and as I have said before, keeping the Simpiesometer in the dark. I think these improvements would give, if not a title to a patent, at least to a new name, “*Tropical Tempest Simpiesometers.*”

P. S.—I have seen in some patent Simpiesometers a contrivance for corking the cistern when moving the instrument. If instead of a cork this was a stopper of caoutchouc, and could be screwed down, it would be a great improvement.

Messrs. TROUGHTON’S note to Mr. LEPAGE is as follows:—

R. C. LEPAGE, ESQ.

29th December, 1842. Fleet Street.

SIR,—I find that in extreme cases, such as those mentioned by Mr. Piddington, the Simpiesometer would get beyond the range of the scale, and suffer the damage described in his letter; moreover, I think that a door to the case in order that light may be admitted only when necessary, a very judicious precaution.

If you desire it, we can soon prepare one with the improvements.

I am, &c.

(Signed) W. SIMMS.

The instrument has just been landed, at a cost of sixty-four rupees, and a brief description of it may be worth putting on record for our distant subscribers. The tube is, from top to the bottom of the curve, 18 inches long, the common Simpiesometers being only about 15, and at a pressure of 26 inches, with a temperature of 80°, would still leave about an inch of oil above the level of that in the cistern: and I trust it is not likely to undergo any severer trial. There is a slide with (I suppose,) a caoutchouc stopper to the cistern, and the usual register plates at the bottom.

The wooden frame is made very solid, and has a polished brass door in front, with hinges and hooks, and I may mention finally, that it was brought out from England screwed up in the cabin of a ship, and this is indeed the only safe way of getting out these delicate and fragile instruments.—H. P.

Report on the Government experimental working of the Copper Mines of Pokree in Ghurwal, with notices of other Copper Mines. By G. S. LUSHINGTON, ESQ. Commissioner, Kumaon and Ghurwal.

No. 1780.

To G. A. BUSHBY, Esq. *Secretary to the Government of India, General Department, Fort William.*

SIR,—With reference to your communication, No. 866, dated the Revenue Depart- 11th November, 1840, I am directed to forward
ment. for submission to the Right Honorable the Governor General in Council, the accompanying copy of a report by Mr. Commissioner Lushington, on the results of the mining experiment conducted at Pokhree in Ghurwal.

I have the honor to be, Sir,

Your obedient humble servant,

R. N. C. HAMILTON,

Officiating Secretary to the Govt. N. W. P.

Agra, the 16th December, 1841.

No. 88.

To the *Officiating Secretary to Government, North West Provinces, Revenue Department.*

SIR,—I have the honor to return the report on the Pokree mining experiment received back with your letter of the 8th November, the omissions adverted to having been supplied.

2. I am not aware of there being any inaccuracies in the report in its present state, but should any be discovered, I would beg the favor of their being corrected in your office if possible.

I have the honor to be, &c.

(Signed) G. S. LUSHINGTON, *Commissioner.*

*Kumaon Commr's. Office, Camp Reonee, }
The 17th November, 1841. }*

Account of the experiment carried on at the Pokree Copper Mine, Ghurwal, under Mr. Wilkin, with notices of other Copper Mines in that district.

In the 83d Number of the Journal of the Asiatic Society, is an account, by Captain H. Drummond of the 3rd Light Cavalry, of some of the Kumaon copper mines visited by him ; this account was drawn up agreeably to the orders of the Governor General of India, and extracts from it were published for general information. In this report Captain Drummond suggested, that with a view of obtaining more correct details than were then forthcoming, as to the advantages or otherwise, of working any one of the Kumaon or Ghurwal copper mines under European superintendence, a certain sum should be advanced by Government for an experimental opening of such mine as might appear best suited to the object in view. This proposition received the sanction of Government in November* 1838, the sum of Rupees 2415 was allotted from the public treasury, being the amount of an estimate submitted by Captain Drummond, and the charge of the experiment was assigned to Mr. Wilkin, an intelligent and respectable Cornish mining assistant, who had accompanied Captain Drummond from England. Mr. Wilkin's personal salary was at the same time fixed at 150 rupees per mensem, by orders of the Governor General.

The mine selected, agreeably to Captain Drummond's and Mr. Wilkin's opinion as the scene of operations, is situated near the village of Pokree, pergunnah Nagpoor, Ghurwal, and is generally known by the name of the Pokree mine. The village of Pokree, is distant from Almorah about eighty miles (say seven marches) North, and about seven or eight miles ; on the right, or Northern bank of the Aluknundah river ; from Sreenuggur it is about fifty miles, or from four to five days' journey for a loaded man. The elevation of the Deothal temple, or as it is commonly called Deothan, above the village of Pokree, is given by Captain Webb at 6,288 feet ; the village is, I think, about five to six hundred feet lower, and the mines in its vicinity range from the latter to the former altitude.

* Letter from the Secretary to Government to the Commissioner of Kumaon, dated 26th November, 1838.

The climate is excellent, admirably adapted to the European constitution ; water good, and oak,* fir and other timber trees abundant. The soil of the neighboring villages is good, and the crops are of the usual kind. The roads also from the mines to Almorah, the capital of Kumaon Proper, and to Sreenuggur, the capital of British Ghurwal, are perfectly safe for foot and horse travellers and loaded porters, and though rudely and unskilfully constructed, are kept in good repair by the civil authorities.

In going to Pokree from Almorah or Sreenuggur, the traveller has to cross the *Aluknunda* river by a jhoola, or swinging bridge of rope, constructed of the grass or sedge, termed *bhabur* by the natives, and the botanical name of which is *Criophorum canabinum*.† There are now on that route two of these jhoolas erected over the Aluknunda, one of which is situated at Kumpryag,‡ where the Pindur and Aluknunda rivers unite, (thus forming one of the Pryags, or holy unions,) and the other at Buniote,§ about five miles lower down. The ascent from the hot valley of the Aluknunda to Pokree is steep and rugged, but the road is safe, and the traveller is amply compensated for the fatigue and labor of the ascent, by the beauty and picturesqueness of the scenery, and by his transit from the hot stifling atmosphere of the valley to the pure and salubrious temperature of the surrounding mountains. Nor could he fail, if interested in such studies, to admire the vast and instructive series of vegetable forms that meet the eye in the ride up from the river ; for, leaving the mangoe, peepul, date, and other well known tropical trees at the base, he passes by degrees into the vegetation and climate of European or temperate countries.

The Pokree mines had for many years been known and worked during the rule of the Hindoo Rajas of Ghurwal, and when the latter were driven out by the Ghoorkhas, the Nepal dynasty did not overlook the resources of wealth which these mines were supposed to con-

* Oak and fir were the only woods made use of in the mine by Mr. Wilkin, the oak for frames and the fir for planking. There are three kinds of oaks, the (bauj,) 1, (phuliart) 2, and (tilouj) 3 at or near Pokree, and one fir. The oaks are the (*quercus*) 1 *incana*, (*camlossa*) 2, and (*semicarpifolia*) 3 of botanists. The fir is the *pinus longifolia*, and as the wood is highly resinous, matches of it are used in lieu of candles in the mines, also as torches in travelling.

† Royle's Illustrations, page 415.

‡ Elevation of the Kumpryag rope bridge, 2136 feet above the sea, (Capt. Webb.)

§ Elevation according to Capt. Webb, 2294 feet.

tain. It is, however, impossible to ascertain with accuracy the amount of revenue yielded from the Pokree mines, under the Hindoo or Ghoorkha* rulers. In the absence of authentic records, tradition has stepped in, and the result is, as usual, gross exaggeration and hyperbole. The older miners of the place, some of whom are still extant, assert, that one of the mines one year yielded 50,000 Rupees profit. How much of this account is true I have no means of ascertaining, but this much is certain, that from the time of the Ghoorkha conquest of Ghurwal, (1803,) up to the year 1838, the produce of the Pokree mines had become more and more scanty, and that when, (towards the close of the above year,) these mines were handed over to Mr. Wilkin, the actual revenue at which they were rated in the public accounts amounted to 100 rupees per annum, and this small sum was eventually remitted for that year, owing to the poverty and utter inability of the farmer to pay the Government demand.

Mr. Wilkin commenced operations in December 1838, and from that month to the end of June 1841, the works were carried on under his constant superintendence, with more or less vigor.† The progress made in excavating the adits, varied at different seasons. It appears to have been smallest during the rains, when frequent "break-downs" took place in the mines, and at other seasons the hardness of the ground and scarcity of workmen prevented much progress being made. The total amount of work, according to the returns sent in by the assistant, and expenditure incurred in making them is, as follows:—

* In Mr. Traill's Account of Kumaon, (Asiatic Researches,) I find 4801 Rupees only given as the Jumma fixed by the Ghoorkha Government of 1812, for the whole province of Kumaon and Ghurwal, under the head of "mines and mint duties." The Ghoorkha rupee was worth about 12 annas, so that in Company's Rupees the sum was only 3600 Rupees. This, however, was merely the Government revenue accounted for by the Nepalese Soobahs to the Katmandhoo Government, what else may have been levied from the former, under the heads of Bhent, Nuzerana, &c. &c. I cannot pretend to say. From the year 1815, (conquest of Kumaon) the revenue derived by the British Government from mines has averaged as follows:—

Kemaon Proper. Ghurwal.

Copper,	Rs. 12,00 to Rs. 801,	Rs. 2,086.	Highest mining revenue of
Iron,	1,905	226.	the province, Rupees 5,417.

† The workings were carried on night and day, the laborers being formed into gangs, and relieved at fixed hours. Tools were supplied from the magazines, whilst others were made up by Mr. Wilkin's smiths and carpenters; the whole of these expenses are included in the abstract, except the value of the magazine tools, and one or two barrels of gunpowder expended in blasting.

		Fms.	Ft.	In.	Rs.	As.	Ps.	
Progress in December, 1838,		0	0	0	44	11	9	
Rajah's Mine—	} Chowmuttee ditto.	January, 1839,	17	0	0	153	9	0
		February, ..	12	0	0	136	2	0
		March,	10	0	0	125	0	0
		April,	10	1	6	* 213	4	0
		May,	8	4	0	127	1	10
		June,	1	3	0	130	14	0
		July,	4	3	0	80	9	0
		August,	3	2	0	73	8	0
		September, .	2	0	0	120	4	8
		October,	8	1	7	135	15	4
		November, ..	14	3	0	141	2	8
		December, ..	13	4	0	112	5	0
Total,..		106	3	1	1,594	7	3	
January, 1840,..		13	3	6	151	13	10	
February,.. ..		14	0	0	143	10	6	
March,		11	0	0	160	12	0	
April,		19	5	2	162	10	3	
May,.. ..		19	4	9	103	5	10	
June,		3	1	0	54	10	6	
July,		0	0	0	56	15	0	
August,		0	0	0	17	6	0	
September, ..		0	0	0	16	5	0	
October,		2	0	0	42	5	0	
November, ..		0	3	0	96	2	0	
Total,..		190	4	6	2,600	5	4	

Operations suspended and repairs made to frames.

Ditto ditto.

In this month the Adit, Chowmuttee adit, broke down at 40 fathoms from the entrance and was partially secured.

(Same remark,) ..

Chowmuttee Adit reopened and partly repaired, and new ground excavated to the extent of,

Repairs completed and in new ground Adit driven.

The amount originally authorized by Government having by the end of November 1840 been expended, a reference was made to the Honourable the Lieutenant Governor, as to the propriety of continuing the workings, and the point having been submitted for the

* In this is included, 60 to 70 Rupees for carriage of materials from the Delhi magazine.

consideration of the Right Honourable the Governor General, it was resolved, that a further sum of 1,000 rupees should be advanced for the prosecution of the experiment in the Chowmuttee mine alone. Mr. Wilkin's personal salary of Rupees 150, was also sanctioned for nine months further, commencing with October 1840, and ending with June 1841.

I annex a Table of progress and expenditure for the above period, *i. e.* from December 1840 till the end of June 1841, when operations finally ceased.

	Progress.			Rs.	As.	Ps.
	Fam.	Ft.	In.			
December, 1840,	7	1	0	74	9	0
January, 1841,..	8	0	0	87	14	0
February,.. ..	14	0	0	86	4	6
March,	11	0	0	120	4	0
April,	5	3	0	105	6	0
May,.. ..	12	2	0	125	6	3
June,	8	5	5	164	4	1
Total,..	65	11	5	763	15	10
Add former workings,..	190	4	6	2,600	5	4
Grand Total,..	257	3	11	3,364	5	2

The workings above specified were carried on in three different mines, two of which had been worked in the time of the Hindoo Rajas, and one was entirely new. The names of the two old mines reopened, and worked by Mr. Wilkin were: 1st, the Chowmuttee; 2nd, the Raja's mine; and the following account of the mines and operations carried on in them is contained in a report from Mr. Wilkin, dated July 1841, and which as it also conveys interesting information concerning other Ghurwal mines, I may be excused for quoting almost entire.

“The Chowmuttee mine at Pokree, is situated in talc which rests on dolomitic limestone. It was adopted for the Government experiment, as the one in which ores were most likely to be found near the surface, where the experiment would be least likely to interfere with the revenue, and where the inhabitants were most favourable to the introduction of a new system. The experiment was commenced at the end of 1838, and has been continued to the

present time. During this period, an adit has been driven into the mine on the course of the lode 77 fathoms, 0 feet, 8 inches, and an underlying shaft was sunk on it at 28 fathoms from the entrance; a cross cut has been driven north from this shaft 20 fathoms, 4 feet, 0 inch through dolomite quartz, and talcose schist; but without finding any new lode, excepting a small bed of iron ore. A rise of seven fathoms was driven up from the adit at sixty-one fathoms from the entrance, and a diagonal shaft was sunk to meet the rise from whence a gallery has been extended eastward over the adit, 19 fathoms, 2 feet, 4 inches, of which 8 fathoms, 5 feet, 0 inch is in poor ground; 4 fathoms, 0 feet 0 inch in old workings, and 6 fathoms, 3 feet, 4 inches in ground, which in Cornwall would be worked for one-third of the ores. Of the adit, 5 fathoms, 3 feet, 0 inch were in old workings; 42 fathoms 4 feet, 2 inches in ground that would on an average let for one-half tribute, and 16 fathoms, 2 feet, 6 inches in ground that would not pay for working, besides 12 fathoms, 3 feet, 0 inch of the outer part of the adit, in which no ores were found; very little ores have been left visible in the bottom of the adit or the eastern end of the mine, but the mine may improve if sunk deeper or extended further; however, I should prefer working the western part of the mine, where the lode is wider, and the ores of better quality. A ventilating passage was carried forward over the adit from the first mentioned shaft to the rise, and a winse was sunk under the adit three fathoms; besides which, other excavations, amounting to about twenty fathoms of ground were made, and conveniences for clearing ores, workshops, &c. have been built. The expense incurred by this part of the experiment (omitting European superintendence,) has been Rs. 2,846:8:9, and the return of copper is Rs. 231:4:4, besides 3 to 400 Rs. which may be expected from ores yet unsold. The roof of the adit now offers a good field for tributers, and if worked on a proper scale, it may repay the expense which has been incurred in driving it; but it is not likely to do so without machinery for cleaning and smelting the ores, which generally contain only 2 or 3 per cent. of metalliferous ores, or from $\frac{1}{4}$ to $\frac{3}{4}$ per cent. of copper.

“The Chowmuttee lode, after crossing the ridge east of the mine, enters a very compact bason, in which is situated the Doomed Mine; this mine has not been worked to any considerable extent,

owing to the abundance of water, and softness of the talc; but it is said to have a good lode in one part of it, the lode then crosses the hill near Deothan, a small village above the mine, and is found near Googlee and Reswarra, where I have seen ores extracted from it; but I do not think it likely to be profitable on that side of the hill.

“The Raja’s mine is situated about 450 yards north of the Chow-Raja’s Mine. muttee mine in common dolomite, which rests on talcose schist. It seems to have been discovered by the out-crop of copper in the precipice above the Pokree village, and to have been followed down to a depth of 70 fathoms, at which level an adit was brought into the mine, which must have been driven 100 fathoms through dead ground, (*i. e.* in which no ores are found,) ere it reached the copper formation; how far it had been driven beyond that cannot be ascertained, but the old miners state it to be a considerable length. There are other adits, by which the mine was worked previous to the bringing in of the deep adit, and the next one above it is said to have been the principal entrance by which the ores were brought out. At the time when the adits fell together, which occurred about 60 years ago, there were three places in which ores were found: namely, the Gajà Chauk, Kumera Chauk, and the Burtwal Kooa; the Gaja Chauk was entered at the level of the deep adit, and worked on so large a scale, as to require timber 20 feet long to support the roof, and finally it became so large, that the miners contented themselves with picking up, at the risk of their lives, the ores that fell down from the roof, until it all fell in together. The Burtwal Kooa was probably on the same lode as the Gaja Chauk, under the level of the adit. The Kumera Chauk was probably on another lode, (Kumera being the name for talc,) the ores of that lode being muddy and requiring to be washed. The produce of the mine at the utmost is said to have been 300 seers of ores, worth 25 per cent. of copper per day, of which the Raja claimed two-thirds, and the remainder was shared by the laborers, who also held land free of rent. This was the best mine in the province, and the old inhabitants of Pokree always spoke of it as a place of great riches. The adit was allowed to fall together during a dispute between Raja Sackrit and his brothers, and though an attempt was afterwards made to open a new adit near the old one, it was never

completed. On my arrival here I commenced opening the second adit, (*i. e.* the one next above the deep one,) but found it too expensive for the limited means at my disposal; and it was abandoned after being opened and secured with timber 31 fathoms, 1 foot, 6 inches, at an expense including native superintendence and materials of Rupees 346: 12: 8. To open the mine properly, both adits should be repaired, and two new shafts sunk from the surface into the mine, which would cost about 4,000 Rupees, and it would be necessary for the proper working of the mine. No information can be obtained as to the number of lodes in this mine, but I think there are three, on the north one of which the new mine is situated, about 60 fathoms north-west of the Raja's mine."

"In the new mine the lode was very promising, and yielded good
New Mine. specimens of ore near the surface, but at a depth of 15 fathoms it became poor, and was consequently abandoned, after being extended 23 fathoms, 3 feet, 0 inch, at an expence, including native superintendence and materials, of Rupees 245: 11: 0."

In addition to the above three mines, in which Mr. Wilkin's operations were carried on, there are several other copper mines in the vicinity of Pokree, some of which were worked in former times by the native miners, and some again have never been tried. None of these were attempted by Mr. Wilkin, but I find on his report the following notices of them, and as the opinion of the practical miner must be infinitely more valuable and satisfactory than any remarks that I could offer, I consider it right to extract them.

"Nota mine is situated about two and a half miles north-west of
Nota Mine. the Pokree mines, in talc, which rests on dolomite limestone. The lode is a bed of yellow or buff coloured talc, about four feet wide, dipping north-west at 50°; it rests immediately on the dolomite limestone and has a sulphuric effervescence on the surface. This mine is said to have been rich; it is situated on the western side of an extensive bason or valley, on the eastern side of which ores have been turned up by the plough, but no mine has been worked. This is an extensive field for mining, as the lode may be productive throughout the bason or valley. There is wood and water for all purposes near this mine.

“The Thala mine is situated about a mile north-west of the Nota mine, probably on the same lode, in an extensive plain, or comparatively level surface. It was first worked in 1810, and again in 1825; but there being no good facility for adits, the water prevented its being worked to any considerable depth. The miners who worked it state the ores to be copper pyrites disseminated in a lode of two feet wide, one-fifth of which was metalliferous. An adit of fifty fathoms in length would reach the mine ten fathoms below the surface; below this adit a machine might be erected, which with the surface water and that of the mine would continue to work throughout the year, and keep the water of the mine to a considerable depth. There is plenty of wood for all purposes in the neighbourhood of this mine.

“The Danda* mine is situated on the hill, about 500 yards above Thala mine in chlorite slate and talc, which on the north-western side, comes in contact with common dolomite. This mine has been worked to a considerable extent, and is said to have yielded 52,000 Rupees profit in one year. The ores are of good quality, and found in three or four different beds or lodes, which dip into the hill at an angle of 30°. The chlorite slate, in which the beds of talc and ores are found is so hard as to stand without timber; it also contains finely disseminated copper in small quantity. The lodes run into a fine fall or bason westward, in which, I think, they would be found productive. There is abundance of wood near this mine; but no water for machinery nearer than the Thala mine.

“The Talapoongla mine is situated about a mile north-east of the Danda mine in talc, which rests on dolomite limestone. The strata, in which the ores are found, is about six fathoms wide, dipping south-west at various angles. The bed is extensive, but the ores are scarce; however this might improve at a distance from the surface; hitherto little has been done, except washing away the strata during the rainy season. It has good facilities for wood, water and adits. Ores have been found in a pre-

* A ridge or crest of a hill is called Danda in the hill language, and this mine being on the ridge, gets the above name.

cipice, east of this mine, near the village of Bungtul, but at present the outcrop is covered with rubbish ; it is in the talcose formation, and has good facilities for working.

“ The Khurua mine is situated in the ravine below Bungtul, near Khurua Mine. its junction with the Nugol river in talc; it was discovered by the water of the ravine washing away the strata, and leaving a quantity of ores exposed to view ; these ores were taken away by the Pokree miners, and the mine worked five or six fathoms under the surface, beyond which they were prevented from going by the water. They tell me that the lode at the bottom of the mine for two fathoms in length is one foot wide, of solid copper pyrites. Of late years, nothing has been done at this mine beyond washing among the surface, which contains a small quantity of copper pyrites. There is plenty of wood in the neighbourhood of this mine, and water for machinery, but no facility for adits.”

Such is the account given by Mr. Wilkin of the copper mines at, and in the vicinity of Pokree, the whole of which he has repeatedly visited and examined, as far as the nature of the ground would permit. Of other copper mines situated in the Ghurwal district, the most celebrated are the Dhunpoor* and Dhobree mines, the former being on the north, the latter on the south side of the Dhunpoor chain of mountains. This chain, rising to an altitude of 9,500 feet above the sea, is on the south or left bank of the Aluknunda river, directly opposite to the Pokree hills, and to the great Himalyan chain, covered with eternal snow. The view from the crest of the Dhunpoor, ridge is beyond description beautiful and majestic. The great castellated peaks of Budrinath rise directly in front of the spectator, and on either side of these as far as the eye can reach, appears a long succession of other snowy peaks ranging in form and altitude ; but all and each surpassingly grand and sublime. No view that I know of in Switzerland, equals this in vastness and extent ; and in altitude the peaks of Gungotri, Kedarnath, and Budrinath to the left, of Trisool,

* These mines are leased to a farmer at the sum of 1,900 Rupees per annum. Some villages are attached to the mine, and the land revenue derivable from them is included in the above. It would amount to about 200 Rupees per annum as a separate item. The inhabitants of the villages work in the mines, and receive a share of the produce ; they are what Mr. Wilkin calls “ tributers.”

Nundadevi, Purychoola, and Kylas to the right, fully merit the title bestowed upon them by the Shastra,* of "Mountain Kings." Mr. Wilkin reports, that "the Dhunpoor mine is situated on the north side

Dhunpoor Mine. of a high† and precipitous range in compact dolomite." The ores of this mine are principally copper pyrites and grey or vitreous copper ore with the red oxide, and green carbonate in smaller quantities: the latter being scarce. The ores are found in a bed, (or channel of ground fifty or sixty feet wide,) which runs nearly north and south, and underlies east about one foot in the fathom. It is divided by a bed of potstone or indurated talc, which runs through the copper formation longitudinally, conforming to the strata, and having a frith or *flukan* on the western side.

"This lode of potstone will facilitate the driving of passages into the mine, and it is sometimes productive; but the greater part of the ores are found in the adjoining rock in seams and branches, which cross it in every direction. The seams of ore are said to be one foot thick at times, but generally they are less than one inch thick, and any thing more than that is considered a prize by the miners. When I visited the mine in 1838, the best seam or vein which I saw was not more than half an inch thick; but on my last visit in 1841, I saw one two inches thick, and I was informed that it had been one foot thick during the interval between my visits. It is perpendicular, and cut out at the bottom of the working by a horizontal vein which carried it eastward; the ores are mostly within one foot of the horizontal vein, above which it dwindles away to the size of a reed. All the other places which I saw, were poor in comparison to this. The ores are the softest part of the rock, and are consequently dug out first, after which the miners burn the rock with wood and then throw water on it. Owing to the calcareous nature of the rock, this process facilitates the work considerably; but still I think blasting would be cheaper, as the burning does not penetrate beyond a few

* Captain Webb gives the following altitude of the Dhunpoor village, 7,956 feet; the mine is a few hundred feet higher, and the ridge above the mine in some places is rated at 9,500 feet above the sea.

† The repeated allusions to the great Himalyan chain in the sacred books of the Hindoos, are too well known to require quoting. The names assigned to some of the peaks are, I think, appropriate and poetical: such as Kada-nath, Lord of water; Roodra-nath, Lord of the Roodras or Demi-gods.

inches in the rock, and the passages are consequently small, except when two or more veins meet. The veins are so numerous, that the rocks between them are seldom more than 3 or 4 feet thick, so that it would certainly be better to have a large working, which would include a number of veins, than to work on the present diminutive scale. The mine is so full of rubbish, that it is difficult to get through the passages, for nothing is brought out of the mine but the ores, and the rubbish being left within, fills up the mine and impedes its future working. At the present lowest working of the mine, there is a commodious passage on the claystone lode, 60 fathoms in length; but the outer 20 fathoms has crushed together; below the inner end of this passage, there is an extensive old working, which is said to be rich, but the present generation of miners have never been able to get the water out of it; beyond this, the mine has been worked to a considerable extent, but the passages were so full of rubbish, that I could not go into them. An attempt was made to bring in a new adit to drain the mine to a deeper level than at present, previous to the Ghorkha rule; but after being driven 15 fathoms, it was abandoned owing to the ores in the mine failing, and the laborers being sent to the Nagpoor (*i. e.* Pokree) mines, which were then rich. No attempt has been made since then to drain the mine below the level here spoken of. The lessee informed me, that he formerly realized from three to four thousand Rupees per annum from this mine, but that lately, the profits have been very small. I am unable to give a correct section of this mine, but the following will convey a tolerable idea of its leading passages, and the rest may be considered a perfect honeycomb from entrance to end.*

“There is water for machinery in the ravine below the mine. Wood for all purposes is rather distant, but owing to the supply of labour, charcoal is cheaper here than at Pokree, where the wood is nearer. The smelters at this mine are very industrious and expert at their work, and their mode of smelting is superior to any other in the province, excepting the Dhobree people, who work on the same principles, using abundance of decomposed felspar and limestone flux.

* As there is nothing of interest in this sketch we have omitted to copy it.—EDS.

“The Dhobree mine is situated on the south side of the Dhunpoor range, in very nearly the same kind of rock as the Dhobree Mine. Dhunpoor mine; but in this mine, most of the veins are horizontal, running along the side of the hill. At the surface they are very small, containing oxide of iron and green stains of copper, and occasionally copper pyrites. The present working mine is not extended very far from the outside of the precipice or surface, the ores being much the same near the surface as at a distance from it. When the miners find their passages growing long and tedious, they begin outside on a new vein. There are several old mines west of the Dhobree village; on entering one of them, I found it very extensive, the ores seem to have been most abundant where the horizontal vein was crossed by perpendicular ones; but as far as I went, the whole of the horizontal vein had been taken away, and often crawling to a considerable length, I was obliged to return for want of torches. I got a small specimen of ore from one of the perpendicular veins, of which there were two or three running south-east and north-west. The western one of these veins is said to have been very rich, but it fell in about the time* the Ghoorkhas entered the province, and has not been opened since. The ores of these mines are principally copper pyrites, worth about 25 per cent. of copper.

“There is water for machinery about a mile and a half below the mine, and wood for all purposes near that place. There is another mine on this range at Molghirree; it is rented at 25 Rs. per annum, and said to be in the same rock as the Dhobree mine. There are other mines of both copper and iron in Dhunpoor, but none of them are worked, nor have I seen them.”

From the following memorandum, it will be seen that the experiment conducted by Mr. Wilkin has entirely failed, as far as a profitable return for the capital expended is concerned.

Memorandum of expenditure on account of the Government experiment at *Pokree* :—

Paid to Mr. Wilkin from the Almorah Treasury,

Rs. 3215 0 0

* 1790.

Expended in working the mine as per monthly statements,.....	Rs. 3364	5	2	
In which is included value of Copper sold by Mr. Wilkin, and carried to account, amounting to,	149	5	2	
Total expense to Government, _____				3215 0 0
Deduct value of Copper sold and paid into Treasury,.....	272	3	3	
Ditto of Copper sold, but not yet realized, _____	358	0	0	
				630 3 3
So that when this last item has been realized, the account will stand thus:—	Expended,	3215	0	0
	Returns,	630	3	3
				<hr/>
Balance against the Experiment,		2584	12	9
Exclusive of the cost of European Super- intendence, at the rate of 150 Rs. per month for 32 months,		4800	0	0
				<hr/>
	Total Rs.	7384	0	0

This result is in my opinion to be attributed solely to the poorness* and scarcity of ores found, and not in the least to any want of skill, zeal, or patience on the part of Mr. Wilkin, of whose intelligence, activity and trustworthiness I have a very high opinion, and every mining undertaking is, after all, more or less a lottery. In this particular instance, every thing has, I conscientiously believe, been done that was practicable with reference to the means placed at the superintendent's disposal, and if the result has been a failure, it cannot in fairness be attributed to him. If it be urged, that the fact of the Raja's and Chowmuttee mines having been worked in former times, ought to have suggested the probability of the lode being exhausted, it should not on the other hand be forgotten, that the sum placed by Government at Mr. Wilkin's disposal was not sufficient to warrant his devoting the whole of it to a new mine, which after all might have proved equally barren as these. Native accounts represented these mines to have been rich and productive at the period of their abandonment, and the miners of the place still hold to this belief. Nor was it in the first instance suspected, that the mine had been so far penetrated into

* Poor, with reference to the means of smelting.

as has been proved. Taking these points into consideration, I see no reason for believing that course adopted was injudicious.

The failure of this undertaking renders it impossible for me to record an opinion in favour of fresh experiments being made under European superintendence at Pokree; I fear no such experiment could pay at that place, and with regard to the copper mines of the province generally, I have reluctantly come to the opinion, that they do not present a fair field for the employment of capital on the following grounds:—

1st. The great distance of the Pokree and other copper mines of Ghurwal from the markets to which their produce would have to be brought.* 2d. The absence of water carriage, and slowness and expense of carrying articles of bulk in a country like Ghurwal. 3d. The non-existence of coal and the cheapness of English copper, carried as it is entirely by water to the great commercial towns of Upper India. The above circumstances would, I apprehend, be insuperable obstacles to the success of any speculation of the kind. For supposing even that a rich and abundant copper mine should hereafter be discovered, and that by European superintendence and the aid of machinery, great improvements were made in every process of mining,† and the price of the article (which now sells at the door of the mine at a dearer‡ rate than English copper does in the plains,) were to be greatly reduced, I still think, that the cost of transporting it to a good market would absorb all returns, or leave little profit to the speculator—further that this profit would be in the course of a few

* The copper mines of Kumaon Proper, at Seera and Gungoolee for instance, are also, all situated far in the interior of the mountains. The talcose and calcareous formations in which the ores are found, occupy the high precipitous mountains, which (in this province at least,) separate the mica slate, gneiss, and not unfrequently granite of the central hills from the similar rocks which build up the buttresses and compose the peaks of the great Himalayan chain. This mighty chain itself appears to be partially metalliferous, judging from the lead mines at Ghertee (now waste) between Melum and Neetee, the copper indications at Tola and elsewhere in the Jowahir Pass, and the ores of the latter metal and of iron actually found and worked at and about *Polan* in the immediate neighbourhood of Roodurnath, one of the snowy shrines between Kedernath and Rudrinath.

† The washing and smelting of rich ores under the native system costs 50 per cent. Poor ores do not pay.

‡ Wrought copper sells in the hills at 1 Rupee 12 Annas to 2 Rupees per seer, equivalent to 70 to 80 Rupees per maund. English copper can now be brought at

years (if operations were carried on to a large extent) cease, and the works be abandoned owing to the non-existence of coal. This is not a mere conjectural hypothesis, but rests on what has already occurred, and will again occur in this district. Even under the present petty system of operations, many mines have been abandoned from this cause. The following is an instance of the kind. In the valley of Kheisaree, the northern extremity of which forms the boundary between Kumaon and Ghurwal, iron ore of a good quality is found in great abundance, and many mines have at different times been worked by the native miners, who resort thither annually from the eastern pergunnahs. At present, the chief supply of iron in Kumaon is from these mines, yet although the total quantity produced would with reference to the gigantic scale of English transactions appear perfectly ludicrous, the valley has notwithstanding become nearly denuded of trees, and it is only by shifting about to new sites, less removed from the forest, that operations are now carried on. The extensive pine woods of the Doorgadhee and Jowrasee range, even at the distance of five and six miles from the mines, are now beginning to experience indiscriminate havoc at the hands of the charcoal burners, who cut down and leave to rot on the ground thousands of fine trees, merely consuming the smaller branches, (to save themselves the trouble of splitting the large trunks,) while no provision is made for the renewal of the forest.

As compared with the Pokree and other mining localities of Ghurwal, the Khetsaree valley is, in many respects favorably situated, being four days nearer to Chilkea, to which mart the route is almost entirely through a level country, and bisected by the Ramgunga river, the power of which, and some of its nearer affluents, would be ample for every kind of machinery. Limestone too exists in great plenty, and in skilful hands, would doubtless be turned into large use in the reducing processes. The climate, however, in the valley itself, is unsuited to the European constitution, and until the last few years

Almorah at a less price than the hill copper, the *present* price of the former being 1 Rupee 10 Annas per seer, of the latter 1 Rupee 12 Annas to 2 Rupees.

By recent quotations, the price of imported copper at Calcutta is shewn to be as follows; viz.

Sheathing, per Factory maund,	36 12 to 38 0	Sicca Rupees.
Brazier's,	36 0 to 0 0	„
Old Copper,	37 8 to 37 12	„

during which its surface has been gradually drained and brought under tillage, it was considered scarcely habitable to natives. But as the surrounding heights afford salubrious sites for residence, and as population is fast increasing in the valley, an experiment would in all probability succeed at Khetsaree, if to its other advantages could be added a sufficiency of fuel; but the forest is rapidly disappearing, and burnable coal is as yet unknown. It is true, many *indications* of the latter fossil have been found in the Sub-Himalayan ranges, as for instance at the Bullea bridge between Bheemtal and Bhoumouree, and in the streams which issue from the hill north of Nujeebabad; yet the few poor and immediately exhausted seams of lignite here and there discoverable in the sandstone strata, and upheaved debris of the Sewalics between the Jumna and Ganges, and again between Hurdwar and Bhoumouree, would seem, if *shewing anything*, rather to point to carboniferous beds buried far beneath the base of the lower ranges, than to hold out hopes of their existence near the surface of the secondary rocks, or among the primary formations, where the iron and copper ores are developed.

If happily and unexpectedly, real coal, fit for consumption, and in sufficient quantities, should hereafter be found in the strata opened to view by the Bullea and other streams issuing from the southern face of the Ghagur mountains, or by the Kosilla and Ramgunga in the lower part of their course, the iron mines of Ramghur, now second in importance to Khetsaree, would become of great value; the noble steppes of the Ghagur would be spared from the denudation which now threatens them; and as the intermediate country is easy, and opposes few obstacles to the formation of roads, the mines of Khetsaree would share in the benefits of the discovery.

I have thus enumerated the great obstacles to the success of any mining enterprize of the kind under discussion. On the other hand, there are some considerations to which I proceed to advert, which might at first sight appear to warrant a contrary conclusion. I first allude to the possibility of obtaining a sufficient supply of labor; and secondly, to the character of the people. 1st. With regard to labor; of this I think the supply would be found to be sufficient at the rate of 2* to

* Two annas per diem is the usual rate of hire, but to ensure a constant supply, it would probably be found necessary to raise it to 3 or 4 annas.

4 annas per diem, as none of the hill men appear to have any objection to working in the mines as labourers. The mining, or Aguree caste is, it is true, one of the lowest, but Brahmins, Rajpoots and Khasyas do not object to work as labourers in the mines. I have seen all of the above castes working under Mr. Wilkin at Pokree of their own free will, and have myself often employed them when in the district (also of their own free will) in duties which in the plains, are usually performed by coolies; such as digging, cutting wood, fetching materials for building, &c. 2ndly. With regard to habit and disposition of the people, the natives of Pokree, and generally speaking, of Ghurwal, are docile, good humoured and willing, inferior in point of physical strength to the European; but still capable of performing a very fair amount of work, if well looked after. In common with most Hindoos, they possess the great virtue of sobriety, and for honesty, are remarkable. Nor are they long in acquiring the use of European tools, even of the pit-saw, the manner of working which is so repugnant to native ideas of ease and convenience. With regard to crime, I may state, that robbery, murder, and, generally speaking, all heinous offences, are rare in Ghurwal. I know not how it is, whether it be owing to the nature of the country, the scantiness of the population, to amiability of temper, or want of energy* and spirit; but this fact is certain, that violence and a recourse to bloodshed seem to be almost unknown. If two Ghurwalees quarrel, they seldom proceed to blows, or should a fight actually take place, it is not of that sanguinary and reckless kind which occurs so frequently in England and elsewhere: such are the bright traits of the Ghurwalee character. On the other hand, they are credulous, ignorant, and superstitious to a degree; believing in ghosts, the evil-eye and witchcraft, and by no means remarkable for a love or practice of truth, where they consider it their interest to speak falsely. Still on the whole, weighing the good against the bad, I have often been struck by the many excellencies of their character, and strange though the statement may appear to be, I have at times felt inclined to believe, that compared with similar classes of our own country,

* I do not think the Ghurwalees are wanting in courage, and believe they have proved themselves efficient as Sipahes in Cabool, where many of them are serving in H. M. Shah Sujah's Force.

with all its boasted knowledge and civilization, they would present as many points for approbation as the latter.

I will conclude this report by shortly summing up what I take to be circumstances *for* and *against* the success of any mining speculation in this province. The obstacles are: 1st, distance of the mines from the low country; 2ndly, slowness and expense of carriage; 3rdly, cheapness and abundance of English copper; 4thly, superficiality of the mines yet known; and 5thly, want of coal.

The favourable points of view are: 1st, the excellence of the climate, and 2ndly, the quiet habits and tractable disposition of the people. To my judgment, the reasons urged against the employment of capital appear greatly in excess of those in its favour. If I had funds of my own lying unemployed, I would not, with the knowledge I have of the circumstances of the case, invest them in any enterprize of the sort. In stating this much, I would add, that I am by no means anxious to deter others from embarking capital in a new experiment, should they, with reference to the account of progress, expenditure and returns now submitted, be of opinion, that my view of this matter is incorrect, and that different results would have been obtained, had the expenditure, or first outlay consisted of thousands, instead of some few hundreds of pounds.

(Signed) G. T. LUSHINGTON, *Commissioner*.

P.S.—Specimens of copper ores from the *Pokree* and all other copper mines of this province have been called for, and will be submitted when received, with names of mines, pergunnahs, &c. &c. My report of 7th June 1839, forwarded to the Secretary of Government N. W. P. at Agra, was accompanied by tabular statements, shewing the number of mines, and amount of revenue derived from them in Kumaon and Ghurwal, and can be referred to, if necessary.*

* We have applied for a copy and permission to print this.—EDS.

Brief History of Kalat, brought down to the deposition and death of Mehrab Khan, Braho-ee. By Major ROBERT LEECH.

INTRODUCTION.

It had been my intention to delay writing on this subject, until I could procure a written history of the Ahmadzyes, which I have reason to believe is in existence, and until I could obtain a collection of national ballads from the hereditary Brahoee *sha'ars*, or minstrels; but the interest at present felt in every thing relating to Balochistan, arising from the disturbed, and to many no doubt, inexplicable state of affairs in that country, has induced me, perhaps prematurely, to attempt the task; and for being able to perform it I am chiefly indebted to a Persian manuscript, drawn up in the summer of 1838 at my request, by Myan Sibaghatulla, Sahabzadah of Sarhind, whose family had been settled at Kalat for nearly 50 years.

Mistakes will no doubt be found to exist, as I have had no opportunity of corroborating the original accounts, but I am confident they will all be found, if any, in the early history, and thus only be liable to mislead the curious antiquary, and not the operative politician.

Cabool, 1st June, 1841.

P. S. Myan Sibaghatulla, it must be told, while at Kalat, was a partisan of the wakeel's family.

The word Kullat, in Arabic, signifies a mountain-top: and the word Kalat, in Persian, is applied to a fort built on a commanding eminence; in this sense there are three Kalats familiar to the natives of Central Asia; viz. Kalat-i-Nadio to the N. E. of Mushud; Kalat-i-Ghilzye to the E. N. E. of Candahar; and Kalat-i-Nasseer, the capital of Balochistan. In the Baloch language, which is corrupted Persian, Kalat is applied to a fort in general, and here it is used *par excellence* as "the fort."

This fort was formerly known as Kalat-i-Sewa, from a former Hindoo ruler, by name Sewámál: and his being known by this name militates against the supposition entertained by Pottinger, of Sewa being an hereditary title in the

family, which is reputed to have been of Rajpoot extraction, and Sewa's title was therefore no doubt the military one of Singh, and not the mercantile one of Mal.

The Afghans know the place merely as Kalat-i-Baloch; and in the royal letters patent and mandates of the Duranee kings, the small place of Neecharah is entered with it, as "Kalat-wa-Neecharah," in compliment to the tribe of Neecharahs, who include themselves in the Alakozyes, and boast that their village of Neecharah contains the tomb of their progenitor Alako.

On the accession, or after the time of Meer Nasseer *Khán*, Mehrab Kalat-i-Nasseer. *Khán's* grandfather, the fort became known as Kalat-i-Nasseer, which appellation it at present retains.

The place of the greatest antiquity in Balochistan is the island opposite port Pasanee, called erroneously Sungadeep, but correctly Ashtalla, and also correctly Carmine by Nearchus, if we regard the word as a corruption of Carline, or Kalyayan, (from Kalee, the goddess of fate, and Ayan, abode.)

It is at present known as Satadweep or the island of Sata, (Astula, or Kalee,) According to existing tradition it was once inhabited, but the inhabitants were expelled by the presiding goddess, in her wrath at an incest that was committed there. Pilgrims say, they are now only allowed to remain on the island one night.

Another place of Hindoo antiquity is Hingulaj, (from Hingula, a name for the goddess Kálee, and j, an affix importing position.) There are two places which pilgrims visit; one in a defile of the Hingulaj mountain, through which the river Agher runs, where there is a pool of water and a natural cave, containing a natural pillar, between which and the sides of the cave sinners find a difficulty to pass, while saints experience none; and outside this cave there is a natural platform in the rock, where goats are sacrificed to the presiding goddess Hingula.

Another is an ebullient (not hot) well, in which offerings are thrown, which, when emitted by a successive ebullition, form ingredients of thick cakes, baked on the spot by the pilgrims, who keep fragments as relics. The pilgrims wear as a distinguishing mark of

the order of Hingulaj, a large string of small clay beads, which are to be purchased at Thattah.

Besides these two shrines, the following verse serves as a guide to Other Pilgrimages. Hindoo pilgrims in Balochistan :—

“ At Kalat you may see Kalee ;
And at Mustung, Mahadave ;
At Shal is the old Jogee ;
Panee-nath's grave.”

No tradition is preserved of the march of Alexander the Great through Balochistan, with the exception perhaps of a mountain pass near Sarhad, called Lak-i-Lukman ; Lukman being a fabulous philosopher whom Alexander released from a well in *Baghdád*, where he had been for forty years confined by enchantment.

At the same time, I believe that Alexander the Great is not connected in the minds of the inhabitants with the legend ; but that regarding the work of cutting a pass through a mountain as one requiring great science, and knowing it to be a work of antiquity, they have given the credit of it to one of the only two scientific men of old known to them ; viz. Lukman, the other being Plato.

The inhabitants of the coast of Mukran also know, by tradition, that an army was formerly reduced to great straits in taking the coast route from want of water and provisions.

Bampoor, (originally I have no doubt Bramhpoor,) must always have been, if not the capital of Western Balochistan, at least one of the chief towns, from its fine natural supply of water.

In forming conjectures on the derivation of the word Mukran, it struck me as singular, that the word in Hindoo looked like the word Kirman ; the letters changing places ; as in the words chik-al and kick-al, mud.

I have heard of a rather ingenious derivation proposed in *Mahee Khoran* (fish eaters,) or michran. The Scindians are at the present day called in derision fish eaters. Nearchus says, that the Ichthyophagi believed themselves to be descended from a race who had been once transformed into fish or sea monsters. If this tradition was then in

existence, and the inhabitants believed it, their country might have been known as Mekrine (Maharayan, the abode of sea-monsters.) There is something of this tradition still preserved. The island of Sata-dweep is said to have been depopulated by the presiding goddess, on account of the commission of incest there.

Kech may have been the same with Bramhpoor, if we regard it as reducible from Kánj, a name of Bramhá. Or it may be drawn from Kesh, a name of Vishnoo, when no doubt the town was called Keshápoor.

Of great antiquity also are the caves near Belav, called after Saiful Malook, and more than one account has been given of them.

The whole country of Balochisthan abounds with the remains of what the natives at the present time believe to have been the works of the Gabers, or fire-worshippers; indeed the remains of any kind of solid masonry suggest to them the Gabers as the founders. The following are some of the sites of such remains; viz. in the defile of Jurgee; between Neechárah and Kapoto, at a place called Gat near Zahree; at Zeedee; at Dashtee Gorán near Kalát; at Keel in the Moora Pass; at Kuchakánee in the Tákáree Pass; near Bapow in the Moora Pass; at Mishk between Zahree and the Moora Pass.

The chief antiquity of Kalát itself is a Hindoo temple, dedicated to Kalat Antiquities. the Devee, or goddess Kálee or Durgá, the consort of Shiwa, which is believed to have been in existence even long before the time of Sewá. Again, some say, that the latter was ordered in a dream by Kálee to people the neighbourhood of the temple. Mehráb Khán had a respect for the fakeer of the temple, so much so, that when he died, the Khán gave him a piece of gold cloth for a shroud.

Another antiquity, but of more recent date, is the grave of a faqueer near the Kalát spring, who is said to have considerably enlarged it from what the original inhabitants or Dehwárs made use of. The faqueer is respected both by Mahommedans and Hindoos.

“ While living, Oorfée ! so behave thee,
That when thy life time doth expire,
Mahommadans with “ Zamzam ” lave thee,
And Hindoos burn thee on a pyre.” *From the Persian.*

In Sewá's time, the summit of Kalát only was fortified, and that even very partially, which is now called the Meeree, (or citadel,) an expression peculiar to Balochistan, as in other parts of Khorasan it is called Arg, (Meeree meaning literally, "place of the Meer.")

There are no vestiges of Sewa, except in a part of the present building, between the rooms occupied by Mehrab *Khan's* mother and by his son; there is a small room known as "Khudee-i-Sewa," or Sewa's cabin; and whenever the slave girls get ill there, they attribute it to being possessed of one of Sewa's devils.

The term Brahooe I consider must have been given this people by the original inhabitants of the country, on their first entering it. I believe the word to be a corruption of Ibrahimee, Brahimee, or Brahiwee, as a race either invariably takes its name from its progenitor, or its original country. I have never heard it used in contradistinction to Narooe. Pottinger believes the word to have the same meaning as that of Rohilla.

The only antiquity of these people I ever heard of, is a boundary stone near Mashkai, called "Sang-i-Kumbar," where the Rambaranee patriarch no doubt fixed his boundary with the aborigines on his first settlement.

The latest reminiscence of the past is to be found in four grave yards under a hill to the east of Kalat. The western contains 15 or 16 graves of Ahmadzyes. The eastern, whose dome cannot they say be covered, is that of *Sakhee Meer Samandar*, (the Sambar of Pottinger?)

Between the two is a yard containing the tombs of Meer Nasseer and Meer Mahmood *Khan*, and between this yard and the dome of Meer Samandar, is the burial ground of Meer Shahnawaz *Khan's* family.

The oldest inhabitants of Kalat are said to be the Dehwars, or land proprietors. I do not look upon them as a distinct race, but as descendants of the different lords of Kalat, who have after being conquered, sunk down into tillers of land. The present race, like the other Tajuks of Khorassan, speak Persian, corrupted with the local neighbouring dialects. The Dehwars of Kalat corrupt their Persian with Hindustanee, Pushtoo, and Braho-iky. The following is a specimen:—

Warnáreesá, hamáneemá raftam- Old fellow, this moment I went
 Jargon. hamanjá yak kad over there, there was a hollow
 e bood, aspia khuree kardam, azan- there. I spurred the horse, he
 já puthareed, páash ba kad-i- jumped over it, his foot got into
 moosh darámad, ragh ash taleed, a mouse-hole, he sprained his
 mantharak zadam, sheoshudam, nerve, I made a spring and came
 náf-i-man taleed wa dil-i-man down. I sprained my navel, and
 budeed. my heart got sick.

These Dehwars are divided into five takars or clans.

I do not conceive that Sewa had any government ; but rather that Kalat was first built by him, and considered his estate.

Tradition says, that Kalát passed into the hands of Persia from those of Sewá, and that the governor of the place was of Georgian extraction, who had a deputy at *Khuzdar*, and ruled over the clans, who were divided under separate Maliks and Arbabs.

This governor, after some time, losing controul over his passions, commenced a system of gross tyrannical debauchery, carrying off by force the daughters of the peasantry, and this was carried to such an extent, that the whole population was roused, and the heads of clans determined to administer the remedy with their own hands.

The deputy was much worse than his principal, as he not only required their daughters, but an entertainment of halwah, (a *blanc mange*,) which he had brought to him on a hill which is now called Koh-i-halwah, where the governors of *Khuzdar* now go to hunt.

The governor had for some time been in the habit of requiring *gratis*, and daily, the services of 25 Dehwars to build the defences of Kalat ; such was his fear of their revenge, that before admitting them on the works, he had their persons searched to prevent their bringing in weapons concealed about them.

They were in the habit of baking bread of millet in large balls, with a heated stone in the centre, to provide for a thorough baking, called by the Affghans *kak*, and it occurred to them that this might be the means of their release, and the weapon of their vengeance.

Next day they passed the guards without any suspicion being attached to their bread, and finding the tyrant in a mid-day sleep, dispatched him ; the town was

Revolution.

immediately surprised from without, and the Dehwars became masters of Kalat. On the news reaching Khuzdar, a similar rise took place there, which terminated as successfully.

The descendants of these patriots are now known among the Deh-Brahoee History. wars as "*dodee mast*," or "bread heroes."

Before entering on the history of the Brahoees, I must preface the subject by remarking, that the history of these people is in the hands of the Lohree minstrels, but that I heard from Mehrab Khan himself, that he could trace his descent for twenty-three generations, and that his progenitors emigrated from Halab, (Aleppo).

He also declared himself descended from Ameer Humza, uncle of the Arabian prophet, and a Hashamite Koreish.

Though not in possession of Merab Khan's pedigree, I procured in the early part of 1839, when in Cutchee, that of Baloch Khan Dombkee of Lahree, who traces it to the same source as the Khan of Kalat does. It is as follows: Baloch Khan, son of Mehrab Khan, son of Jalal Khan, son of Shahdad Khan, son of Jalal Khan, son of Meeroo Khan, son of Boot Khan, son of Baloch Khan, son of Meeroo Khan, son of Baloch Khan, son of Mahommed Khan, son of Meeroo Khan, son of Mahommed Khan, son of Husen Khan, son of Isak Khan, son of Ahmad Khan, son of Gulo Khan, son of Pervez Khan, son of Kahloo Khan, son of Madil Khan, son of Noot Khan, son of Bazan Khan, son of Ayalee Khan, son of Zan Khan, son of Matan Khan, son of Sairan Khan, son of Rind Khan, son of Jalal Khan, son of Hareen Khan, son of Gul Kharaj, son of Jarkh Taj, son of Baloch Khan, son of Satookee, son of Ilm-i-Mardame, son of Badee Uzzuman, son of Ameer Humzah, son of Abdu Mutalib, son of Abdu Manaf, son of Abdul Hasham.

Isak Khan had two sons, Saheek and Husen Khan. Chakar Khan is the son of Saheek, he is the progenitor of the Chakaranees of Hindusthan.

The former Jalál Khan, had five sons: Rind, Latree, Hot, Ruraiee and Jahtoee.

The Dehwars on taking possession of Kalat, held a council among themselves, and elected a representative, by name
Representative. Rais Taj Mahommed, the eighth progenitor of the

present Rais Khan Mahommed, and determined on putting him at the head of a deputation, to wait on the Rambaranee chiefs, who then resided at Mashkai, and invite one of them to rule over them at Kalat. The reason for making this choice was no doubt that they required a man of prowess; and where could they find one better to suit their purpose, than among the Brahoees, who had lately colonized, and who had gained every inch of the ground they possessed by the sword? and whose deeds under their chief Rambar, were probably then fresh in the minds of the Dehwars.

This Imaum Rambar it is said had eight sons: descended the Kambar. baranees. Kambar from whom

Ismail,	ditto	ditto	Ismailanees.
Gurgen,	„	„	Gurginadees.
Meroo,	„	„	Meerwanees.
Roden,	„	„	Rodeenees.
Eltaz,	„	„	Eltazais.
Ahmad,	„	„	Ahmadzais.

The Dehwar deputation waited on these brothers at Mashkai, and a consultation was held on the subject of the proposition, when the elder brothers agreed that they would spare Ahmad the youngest, on account of his not having, like them, lands, flocks, and families to bind him to his paternal soil, and as being the most likely not to usurp undue authority.

Ahmad, with a few of his own Brahoee followers, proceeded with the Dehwars back to Kalat, and held his first court under a mulberry tree, outside the fort, to the East, which was situated on *matee* land, (*matee* meaning river deposit,) and under this tree for several subsequent generations, the Ahmadzais held their court, when they had to discuss matters of unusual weight, affecting the general welfare.

Before accepting however the Khanee of Kalat, Ahmad made the following stipulations with the Dehwars:—

1st. He required one of the six canals to be given to him for his support; this canal is called Joe-i-Toot, or Joe Ghulaman.

2d. He required grass, stalls and pegs for his horses; wood for his kitchen; chobdars or macebearers for his court; couriers and runners to procure intelligence; guards on the gates; camel-men for marching.

3d. He required the fort to be repaired when necessary, and the snow to be swept off the houses and works in the winter.

4th. He required to be relieved from entertaining public guests, such as envoys and couriers from Candahar and elsewhere.

Like the Israelites of old, when once determined to have a king, none of the disadvantages urged by the prophet Samuel could deter them—so it seemed with the Dehwars, for they agreed to all these conditions, and continued faithfully to perform these services, with now and then some mitigation; for instance, as Kalat became peopled with foreigners, they were made to repair part of the works, and during the time of Meer Nasseer Khan, in consideration of the great influx of guests, he allowed the Dehwars 2,000 Kareembhanee rupees a-year; besides granting them some bunds or dams in Kuchee—these were however escheated by his successor Meer Mahmood Khan.

Ahmad also made his brothers agree to give him from every flock one sheep, one rope, and one felt rug. This their descendants continued to do until the time of Meer Nasseer Khan, who remitted the tax.

Meer Meerab Khan is, I believe, the seventh in descent from Meer Ahmed, the progenitor of the Ahmedzais, and among these seven, are Meer Mehrab Khan-i-Kalan, Meer Kale Khan and Meer Samander.

Among the eight brothers, the Ahmedzais, Eltazais, and Kambaranees amalgated together, and shared each other's joys and sorrows; that is, they intermarry and pay visits of condolence to each other on the death of a relation, and share in the payment of blood-money.

Of the intermediate Khans between Meer Ahmed and Meer Abdullah, Mehrab Khan's great-grandfather, I am in possession of little information more than the following. Meer Sumandur obtained the surname *sakhee*, or the generous, from his great liberality and hospitality.

It was first under Meer Kale Khan, that the Brahoes rose into importance, and formed any thing deserving to be called a separate independent state. He expelled the tribe of Soomrees or Nomryas from Tuhrah, Baghlana and Khuzdar, whence they took refuge in Lus, and gave the country to the Brahoes. He also made inroads to

the north and north-west, and took tracts of country from the former inhabitants, whom I believe to have been Huzarahs. This latter tribe

Huzarahs. it is true, is now only to be found far North of Balochistan. But there is evidence of their being once settled as far South as the district of Shawl, and this evidence is furnished by the Takatoo mountain, the word Takatoo being composed of *taka*, a wild goat, and *too*, answering in the Huzarah dialect to the Persian *dar*, and Hindu *wala*; and English *er*, as falcon, falconer; and *kutchlak*, caves.

I believe the Brahoees to have gained northern Balochistan from the Huzarahs, and the southern part from the Nomryas, Jokyas and Jaths. This latter tribe once held part of Mukran; and I have more than once been inclined to suppose, that the name had some connection with the country Gedrosia. There is besides a small stream near Cutchee, known by the name of Jathro at the present day, and a tribe called Jattakees, from their inhabiting the Jattak hills in the Brahoock range.

It was under Meer Kale Khan, I should think, and not under Meer Ahmed, that the Brahoees were spread over the conquered country in the following order: the Eltazais were given Baghbana; the Meerwanees retained Mashkai and Kolwah; the Rodeenees and Gurgina-dees were settled in the south, and the Ismailanees in the north; while the Kumbaranees were spread over the country from Kech to Mustung, as their great numbers created apprehensions of a revolution.

As the power of Kale Khan increased, the Badechees of Shorowak and the Panees of Siwee courted his alliance, and it was during this ruler's government that Akhund Mullah Mahommed arrived at Kalat, having fled from She-raz. He was a man of great talent, and his prepossessing manners and his foreign extraction, which rendered him free from localities and interests, induced the Brahoees and their Khan to offer him the office of wuzeer with the title of wakeel, as wuzeer was only applicable to the prime minister of a king. The descendants of this Mullah Mahomed say, that he was by descent a Sayad, but dropt the title on gaining temporary power.

It was this man that first divided the Brahoees and their country into the two divisions of Sarawan and Jhalawan.

Divisions.

Sarawan means "upper country," and is derived from the words *sar* and *abadnee*; thus Sarabadanee, Sarabanee, Saraban (as Beaban,) Sarawan and Jhalawan signifies "low country," from the words *jhala* and *abadanee*.

Sarawan is applied to the country north of Kalat, and Jhalawan to that to the south, while Lus means, the "flat country."

At present, in time of war, the Brahoees assemble under three standards; viz. under the first, the Khan of Kalat and his own retainers; under the second, the troops of Sarawan under their immediate leaders; and under the third, the troops of Jhalawan.

Nothing of importance is really preserved as having taken place between the time of Meer Kale Khan, and Meer Meer Abdulla. Abdulla Khan, who was a bold, proud and enterprising man, and was constantly employed making forays; sometimes in the territories of Shah Mahmood Ghiljee of Candahar, as is shewn by the tomb of Sardar Khan's father being at Lylee Majnoon; sometimes in Sindh; and sometimes towards Derajat. The reason of his invading the latter country arose from the following accident. A Brahoee shepherd, grazing his flocks in the country dependent on Dera, one day

Dera.

allowed his sheep to stray into some cultivation, for which tresspass the former killed one of the sheep, and severely beat the shepherd. He came to Kalat to complain to Meer Abdulla, who sometime afterwards expressed to his nobles his determination of invading Dera. In vain did they try to dissuade him, urging the insignificance of the cause of the quarrel, and the expense of the trip; nothing could dissuade him, and he declared thus in reply: "That one Brahoee sheep nightly leaps in the bowels of Abdulla Khan and allows him no rest."

The foray was made and proved successful, several of the Dera villages were burnt to ashes, and Abdulla Khan's troops returned to Kalat, laden with plunder, and encumbered with captives.

Some time after this, a quarrel broke out between Abdulla Khan and the Kalora chiefs of Scinde, on the subject of the district of Cutchee, to which the Brahoee herdsmen yearly emigrated with their flocks for the winter. During

Kaloras.

the quarrel, Abdulla Khan made several successful forays in the territory of the Kaloras; to resent one of which, Meer Johrab collected a force, and moved out against the Brahoee chief. The parties met and had a severe engagement, in which the Brahoees were defeated, Abdulla Khan was killed, and his corpse was never discovered. With him, fell

Death. on the Brahoee side, besides three hundred men of no note, Meer Zirk Zahree, the chief of Jhalawan, and the father of Mulla Mahommed Raisanee. Abdulla Khan, before his death, inflicted a severe wound on the forehead of Meer Johrab; and ever after, when the subject of a quarrel with the Bhahoees was started in durbar, Meer Johrab would exclaim, "Ah! Baloches, the blood from the wound Abdulla Khan inflicted, still trickles down the forehead of Johrab."

Johrab.

It is also said, that Meer Abdulla Khan made several forays in the district of Kech; but failed to take the fort of that name.

Kech.

Meer Abdulla Khan left three sons: Meer Muhabbut Khan, Meer Mahommed Nasseer Khan, and Meer Eltaz Khan.

Sons.

The elder of these succeeded his father.

Meer Muhabbut Khan's first thought was to revenge the death of his father on the Scindians, and this thirst would never perhaps have been allayed, had not fortune, about this time, brought the Persian conqueror, Nadir Shah, to Candahar.

Meer Muhabbut.

Meer Muhabbut Khan, after a consultation with his nobles, determined to repair to the royal camp, which he joined at Lahore, in its progress to Hindusthan, and stated that the object of his ambition and visit, was to get revenge for the death of his father. Nadir Shah's answer was, "The blood of Abdulla Khan stains the forehead of Nadir, and please God I will seek it at the hands of those fish-eating Scindians."

Nadir Shah.

Meer Muhabbut Khan accompanied the conqueror on his invasion of Hindusthan. When Nadir, on his return, arrived at the Indus, the Khan reminded him of his promise; Nadir immediately ordered the route to be changed in the direction of Scinde, on his arrival on the boundary of which, Mijan Noor Mahommed, the chief, fled to Umarmkote, and the inhabitants in dread left their villages and fled to the hill. On Nadir's arrival

Mijan Noor Mahommed.

at Hyderabad, he lost no time, but by making several forced marches, (fable says one,) succeeded in surprising the Scindian chief in Umarkote,

Umalkote. who immediately surrendered, and on being asked

by Nadir Shah whether it was true he had a well full of gold; replied, "Please your Majesty, I have seven; and have brought the keys of the whole." This answer pleased Nadir, who did not fine him, but brought him with the royal camp back to Cutchee; when he ordered him to be taken to the tents of Meer Muhabbat Khan, to be treated as the latter willed. The Brahoees, after some consultation, decided that Nadir Shah would be offended if the Scindian should be put to death; they therefore contented themselves with requiring, as the price of blood, the countries of Cutchee, Curachee and the Roors, and a lakh of rupees in ready money.

Cutchee.

An agreement to this effect having been concluded in the presence of Nadir Shah, Noor Mahommed was allowed to return to his capital. On Nadir Shah's arrival at Ganjabha, the Scindian governor, Murad Ganjah, entertained him for a week, and then

Murad-i-Ganjah. was killed by his orders, at the secret request of the

Sindh chief, who distrusted him. Nadir then set out for Candahar, via Sannee and Sohian, and the Bolan pass. Meer Muhabbat distributed some of the lands thus acquired to the families of those chiefs who had fallen with his father. For instance, he gave Gajan to the son of Meer Zirk, and Meer Rasheed Khan enjoys it at the present day, and Rahnakha to the Raisanees.

Meer Muhabbat Khan's younger brother, Meer Mahommed Nasseer

Meer Nasseer Khan. Khan, was, with *Agha* Aly Badazyeh, and a few slaves, in constant attendance on Nadir Shah: and

afterwards, on his successor Ahmed Shah. He was looked upon as a hostage; and it is said, that during one of the campaigns, he and his followers were at one time so destitute, that they extracted the half digested grains out of horse's litter to make bread of. Meer Muhabbut, jealous of his younger brother, did not furnish him with funds adequate to his support during the time of Meer Muhabbut Khan. Akhund Mulla Shahdad was wakeel, and his son Akhund Mulla

Mulla Shahdad. Mahommed Haryat was appointed to reside at the court of Ahmed Shah.

One sultry day, when Meer Muhabbut Khan and Akhund Mulla

Shadad were out hunting together, the former asked the latter to give him a drink of water. Mulla Shahdad complied, but with a bad grace, as he regarded the request derogatory to him, and fearing lest the Khan, if not remonstrated with, would demand other menial services from him, wrote a letter to his son at Candahar, saying, I always thought you were *haizat* (alive,) but unless you can get Muhabbut Khan's affairs disarranged for me, I shall think you dead. Akhund Mulla Mahommed Haizat, on receiving this letter from his father, made use of the influence his patron the wuzeer Shah Wulee Khan had over Ahmed Shah, in getting Meer Muhabbut Khan summoned to court. His coming to court, however, is accounted for in the history of Ahmed Shah as follows: When that monarch was on his return from Amanabad in Guzerat, to Candahar, in the third year of his reign A. H. 1162, Muhabbut Khan Baloch came in and paid his respects, and was made chief of the whole of Balochisthan; soon after he began to commit acts of cruelty and tyranny; among which, the murder of Gilan-i-Kasee in Shawl, was the most glaring. This determined the king to fit out an expedition against him. The royal force was opposed at Mustung by a Baloch force under Raim Khan Shaheeranee and Mulla Haizat, and gained a victory, making both the above prisoners. On this news reaching Muhabbut Khan at Kalat, he repaired to the royal camp, surrendered himself, and then, with the whole of his family, accompanied the king back to Candahar.

When he, Mulla Haizat, had effected this, he still openly paid most abject court to Muhabbut Khan, as his lawful chief; but secretly intrigued with the Beahnee chiefs in the Khan's train, and by the aid of presents put at his disposal by his patron the wuzeer, succeeded in estranging the Brahoees from Muhabbut, and transferring their allegiance to Nasseer Khan. For some time these intrigues were carried on secretly; at last the wukeel, throwing off the mask, got the younger brother declared Khan of Kalat and himself wukeel; and had Muhabbut Khan and a few of his confidential attendants put under surveillance, in which he died.

Meer Eltaz Khan went mad; and his frantic tricks often justly caused alarm. One day at Ganjabah, Meer Eltaz appeared before Nasser Khan, when alone, with a

drawn sword. The latter was a little lame, from the effects of a wound received in Persia, and generally had a long straight sword with him, on which he leant. In trying to ward off his brother's attack, he accidentally gave him a thrust, which proved his death-wound. Meer Nasseer Khan was greatly shocked at this calamity, and afterwards his mind took a serious turn, and he fitted out an expedition to Mecca to make atonement for his crime.

When Meer Mahommed Nasseer Khan obtained the Khanship of Kalat, he was twenty-four years of age: and he ruled it is said fifty years. Mulla Mahommed Haizat, as may be supposed, became all-powerful; so much so, that Bibee Miriam, the Khan's mother, is said to have taken her son to him; and solemnly to have confided the lad to his care, saying, he was the controller of her own and her son's fate, as the latter owed his advancement entirely to him.

Meer Nasseer Khan's first care on gaining power, was to reward the companions of his confinement. He conferred the government of Bhag on Agha Aly Badozye. The office of darogah of Kalat, he gave to Mullah Fazul Mahommed Khanahzad. The sundookdaree, to Mulla Peer Mahommed. To Mulla Yaya, he gave the office of phahgasee, and made Mulla Peer Mahommed Kalaghzye, duzbegeer and darogah of Mustong, and Mulla Gudud, his nazir.

Mulla Haizat fixed upon the chiefs to be employed, and took care that they were of sober and modest habit, not likely to mislead the young Khan.

The first time that Nasser Khan is mentioned in the history of Ahmed Shah, is in the following passage:—

In A. H. 1171, being the 12th year of his reign, on the 11th Rujab, the king having received intelligence of Ghazee-ud-deen Khan of Alumgeer, and of Shahzada Timoor, ordered an army to assemble under Meer Nasseer Khan, the Baloch chief, and to march on Cabool. On the 12th Shaban, the king started, and after being detained fifteen days on the road from sickness, arrived at Cabool on the 7th Ramzan.

Nasseer Khan after assembling his troops, looking on the hurry of the king, as arguing his fear of some powerful demonstration on the part of the Marathas, threw off

Rebellion.

his allegiance, and fortified himself in Shawl, and commenced foraying the neighbouring Badeechees, Tareens, and other Afghans. Sometime after in a skirmish with the Kakurs, Rustom Khan Baloch with several followers were killed. On this account, the whole of Balochistan joined Meer Nasseer Khan; except Meer Jahanee and Jangal Khan; who were in consequence obliged to make good their retreat to Iskalkot, a place distant one fursakh from Kalat. Nasser Khan's force gradually increasing, reached at last the alarming amount of one lac.

On hearing this, the king determined on proceeding to Balochistan in person. After seeing Shahzada Timoor, he left Cabool on the 23rd Zilkad, and passing Candahar, encamped on Thursday, 9th Mohurram, on a rising ground, half a fursakh to the north of Kalat, and com-

menced the investment: next day, Shah Wullee
 Siege of Kalat.

Khan was appointed to take up the investment on the west side; Barkhurdar Khan on the north; Shah Pasand Khan on the south; and Khan-i-Khanan on the east. Batteries were erected, and hostilities commenced. Many men were daily killed and wounded on either side, and Barkhurdar Khan was wounded by a matchlock bullet. At last, on Tuesday the 4th of Mohurram, at noon, after a desperate and well sustained engagement, the Baloches gave in, and Nasseer Khan sent his mother and Mulla Haizat to sue for pardon, and soon after followed them himself. The king conferred on him a dress of honor, (at that time coarse satin, called *mushroo*,) and the chiefship of the whole of Balochistan.

The cause, course, and issue of this campaign is however differently

told by the Brahoees, in the following manner:
 Other Version.

Shah Wullee Khan, the all-powerful wuzeer of Ahmed Shah, either finding his influence declining, or taking offence at some act of the king's, instigated his partizan Nasseer Khan to rebel: and then persuaded the king to advance in person on Kalat; which place was unsuccessfully besieged for some time.

Siege.

At last the king authorized the wuzeer to enter into terms. The latter of course had no difficulty in inducing Nasseer

Khan to come out, and surrender: which, it is said, he
 Surrender.

did, accompanied by a few followers, dressed in the rude manner of his country, with raw hide shoes, camel hair coats, and leathern bags on their backs, containing a few handfulls of parched wheat,

and pointing them out to the king, asked, "What can your Majesty want of men whose clothing and food are such as you see?"

Ahmed Shah took Bibee Jan, the sister of Bahram Khan, for a wife
Bibee Jan. for his son Timoor Shah, and her brother accompanied her, with the king, back to Cabool.

A treaty was concluded between Ahmed Shah and Meer Nasseer
Treaty. Khan, on the part of themselves and successors, to the following effect. :—

1st. The Brahoee chiefs are not to interfere in the internal feud of the Sadozyes, and are to be subservient to the reigning king.

2nd. Should an Ahmedzye Brahoee take refuge in the Dooranee country, the Sadozyes are not to support him against the Ahmedzye chief of Kalat ; they are either to give him up to the latter, or employ him about their persons.

3rd. The Sadozyes are not to pursue any of their tribe who take refuge in the Brahoee territory.

The chiefs of the Dooranees and Brahoees exchanged a similar agreement ; with the exception of Barkhurdar Khan, Achakzye, who bore the Brahoees an ill feeling, having, in the Persian campaign, been accidentally wounded by one of them.

This 3rd article was insisted on being rigidly observed, as in the
Observance. case of Shahzadah Humayoon who took refuge from Shah Zaman in 1793 ; and in the case of Shah Shuja, who fled before the Sirdars after his last attempt to regain his throne, and took refuge with Mehrab Khan in 1834.

Nasseer Khan continued to furnish his quota of troops in the Sadozye campaigns ; and it was latterly employed in garrisoning
Service. Cashmere. There are at the present day Baloch works in Cashmere, Peshawar, and Cabool. He received 500 dresses of honor from the royal *toshakhana*, headed the van of the army ; and was entitled to beat drums three
Distinction times a day, and wear two *jigahs*, or jewelled plumes, a privilege never granted to the Sindhians.

Meer Nasseer Khan distinguished himself in one of the king's Persian campaigns. The chief opposed to the Dooranees had a private understanding with the wuzeer Shah Wulee Khan, and the latter, on

Nasseer Khan joining the royal camp, warned him not to volunteer for any attack on the enemy. Ahmed Shah, in public durbar, on several occasions, called for volunteers: no one came forward; at last Nasseer Khan, unable longer to counterfeite the craven, volunteered with 1000 Jhalawan foot, and 1000 Sarawan horse for the attack; during the time it lasted, a false report was brought to Ahmed Shah, of the Khan's defeat! The former sent the news to his mother, Bibee Miriam, who was in the royal camp. This heroic woman made the following reply: "If you say he is dead, I will believe it. Meer Abdulla never approached me without ablution; and I have never given suck to Nasseer Khan without the same; and have never slept with my back to him, how then can he be defeated and alive." A second courier soon arrived, and contradicted the false report; the attack had been successful. Ahmed Shah pleased with the high feeling displayed by Bibee Miriam, conferred on her and her son, the district of Shawl; making a pun on the word.

Shawl. Nasseer Khan out of this district gave the water of Hanna to his patron Shah Walee Khan Bamezye, and it is held to the present day by his descendants.

Nasseer Khan again distinguished himself in Hindusthan, at Muttra, where he was wounded. On his return, Ahmed Shah conferred on him the districts of Harrand and Dajal, (properly Harrand, Dajal. Daoojal.) After this, Nasseer Khan did not campaign in person; he never paid his respects at the court of Timoor Shah: but sent Sultan Mahommed Murad, the hereditary Sultan, to represent him there.

Nasseer Khan made several fruitless attempts to take Kech. He at length made a grand effort, and ordered the whole of his force to assemble in the spring at Khozdar.

When assembled, it is said by Meerza Deen Mahommed to have amounted to thirty thousand horse and foot. The Expedition to Kech. siege of Kech was commenced on its arrival there, but it was beginning to be rather a prolonged one, when Nasseer Khan annoyed at the delay, ordered ladders to be prepared, and the place to be assaulted by escalade at all risks. The attack proved successful. The Zikarees, who defended the place, were either killed or taken prisoners, and the grave of their patron saints defiled. The bones having

been extracted, were burnt with horse litter. The Brahoee loss amounted to seven hundred. Nasseer Khan held the Meeree by means of his own dependants, but gave the town and district to the Lichkees.

During the time of Nasseer Khan, the Immam of Maskat took refuge at Kalat, on account of some convulsion in his own state; and received in grant for his support, half the revenue of the ports of Gwadar and Chobar.

So strict in his allegiance to Ahmed Shah was Nasseer Khan, that he never failed in sending the usual yearly presents, consisting of horses, camels and slaves, not only to the king, but to his courtiers. He has moreover been heard to say, that should none be left of the Sadozye dynasty but a girl, and that girl a blind one, the Ahmedzyes ought to acknowledge her.

Nasseer Khan had a great taste for learning, and invited learned men from all parts to his court. He conferred on them salaries and grants of land, and distributed them throughout his dominions to instruct his ignorant subjects; and never were subjects more in need of religious instruction: it may fairly be said, that they were only made thorough Musulmans of, in Nasseer Khan's time.

An anecdote is related of a Brahoee, who when asked of what persuasion he was, replied, "The persuasion of the Great Khan." On the Khan's return from his Hindusthan campaigns, he made up his mind to introduce shaving of the head among his countrymen, that they might in no way resemble the Sikhs. It was with the greatest difficulty that he got even the people immediately about his court to allow of the innovation, although he set the example by shaving the heads of his own sons. The Brahoees, however, of the present day shew they have in some way profited by their Khan's admonitions, seeing they differ from the Baloches, and never indulge in intoxicating drugs.

Meer Nasseer Khan distributed large sums in charity, besides 2,000 or 3,000 Rupees every Friday in alms. He yearly sent to Mecca, presents to the amount of 30,000 Rupees; and fed pilgrims *gratis*, from one end of his dominions to the other.

In such veneration was Nasseer Khan held, and so proud was the Brahoee nation of him, that an anecdote is told; and the truth of it credited universally. That a Brahoee, on his return

home from an interview with Nasseer Khan, would not for several days after open his lips to a soul, not even to the members of his own family. On his being pressed by his half-frightened friends to disclose the reason of his extraordinary silence, he sharply observed, "How can I speak to such dirt as you, with the same mouth that has been opened to address the Great Khan."

The Brahoees looked upon the descendants of Nasseer Khan as their spiritual as well as temporal chief, until the charm was partly broken by Mehrab Khan, by the number of cruel executions ordered by him: but even in his time, the wild Brahoees from the hills, were in the habit of kissing the threshold of the citadel gate.

An anecdote is also told, that Nasseer Khan, during the early part of his government kept a tame tiger, which he used constantly to visit for the following reason, which he assigned in reply to a questioner: "Whenever I feel rebellious, I look at its eyes, and they remind me of Nadir Shah's, and I am immediately quieted and made loyal again." He also never lost his boyish dread of Mulla Haizat's admonitions. The son of the latter, Mulla Futteh Mahommed, after his father's death, was wukeel during twenty-four years of Nasseer Khan's reign.

When Nasseer Khan was getting old, fancying his end approaching, he reflected that his sons were mere children, and foresaw that the Sindians, on his death, would wrench from them the port of Karachee and the Koorg; he therefore determined, contrary to the advice of many of his self-sufficient courtiers, voluntarily to cede the above places, in favour of their former owners, which he accordingly did by treaty, after several missions and deputations, had been interchanged.

Pottinger mentions, that Bahram Khan made his appearance in Balochistan during the reign of Nasseer Khan, and created some disturbances: but being defeated at Koohak by the latter in an engagement, again retired to Cabool, to which place he had originally accompanied his sister Bibee Jan.

Nasseer Khan had nine wives and concubines; for many years none of his sons by them grew up, but all died at an early age. He had nine daughters; four of which he gave in marriage

to the four sons of Meer Kamal Khan Eltazyé; the eldest, by name Maeé Zainab, commonly known as Maeé Sahib, married Meer Sayad Khan. He gave his other daughters in marriage to the Gichkees and Meerwanees.

When Meer Nasseer Khan was almost beginning to despair of male issue, Bibee Khudejah presented him with two sons:
 Sons. Mahmood Khan and Meer Mustafa Khan; and by another wife, Bibee Jattee, daughter of Kamal Khan, he had a third son, Mahommad Raheem Khan.

Meer Nasseer Khan's death took place at Ganjabah, about six months
 Death. after Timoor Shah's, which happened on the 20th May 1793, and his young, but eldest son Mahmood, succeeded him at the early age of eight years.

Mahmood Khan is twice mentioned in the Duranee history; once together with his brother Mustafa Khan as having in
 Duranee History. 1804 paid his respects to Shah Shuja at Bagh, when that monarch was on his way from Candahar to Sindh, and a second time as having in 1814, paid his respects to Shah Mahmood at the same place.

Pottinger says, that in the early part of Mahmood's reign, Bahram
 Bahram Khan. Khan again made his appearance in Balochistan, and the ministers of Mahmood Khan were obliged to cede to him the district of Cutchee, on condition of his not molesting the remaining territory; with this condition Bahram did not comply, but raised a large force and assumed a threatening attitude: the ministers of Mahmood in alarm, applied to Shah Zaman, who sent a chief to arrange matters, which becoming impossible, war was declared. After several minor engagements, the rivals had a general one, in which Bahram Khan was defeated, owing to the defection, during the engagement, of several chiefs and their contingents. He fled to Hyderabad, where the Ameers refused him refuge, for fear of the displeasure of Shah Zaman. He then set out for Bhawalpore, and died of fatigue on the road, at Tanda-i-Kalandar Shah.

Mahmood's nurse, Daeé Beebo, became a person of great note from
 Daeé Beebo. her method of bringing up the young Khan. When Mahmood and Mustafa grew up, dissensions were sown between them. Maeé Sahab, Ahmed Yar Khan, and the Elta-

favourable opportunity, and attended by Shahghasee Deen Mahommed, repaired unobserved to the Myan quarters, and finding him asleep,

Murder. murdered him. They afterwards made an attempt to murder Mulla Futteh Mahammed wukeel, and

naib Abder Rahman in their quarters, but failed. Mustafa Khan, when the unusual consternation produced by this event was still at its height, despatched, by the Nagour road to Kalat, Sultan Mahommed, Murad Mullazye, and Meer Allee, the nephews of darogah Gul Mahommed, with orders to confiscate the Myan's property, as well as that

Confiscation. of the following Babee merchants, who were all imprisoned, viz. Khaleefa Abdul Kareem; father of the present Faiz

Imprisonment. Ahm,d, Mulla Alif, Bostan, and Myan Moorulla, brother of the deceased.

Meer Mustafa sometime after came to Kalat himself, and released the Babee merchants, having realized, it is said, nearly four lakhs of Rupees, from the confiscated property.

Noor Mahommed Khan Moosanee, father of the present Meer Relationship. Boohir, had, on hearing of the death of Myan Ruhulla, taken his family to a place of safety, at Noghiana, for the sake of the relationship that existed between them. Myan Sibaghatulla, the son of Myan Ruhulla, having married a daughter of Noor Mahommed Khan's.

Another of the events that marked the reign of Mahmood Khan Meer Fakeer. happened as follows: Meer Fakeer, father of Reia Bezanjo rebelled. Meer Mahommed reported the subject to Shah Shuja, and as he, as an Amadzye, could not inflict the punishment of death, requested the king to depute one of his own nobles to sanction the adoption of extreme measures towards the rebel. Naib Gul Mahommed Populzye was accordingly despatched, and arrived at Kalat, and from that place accompanied Mahmood Khan to Khoz-

Execution. dar, where Fakeer and forty of his followers were captured and slain. Meer Mehrab Khan, during the Barikzye usurpation, did not hesitate to put Brahoees to death, without any sanction but his own.

During Mahmood's time, Quettah was twice sacked by the Kakars. An embassy from the Immam of Muskat came to Kalat during Mahmood's time, and never after.

The two brothers Mustafa and Mahmood were continually quarrelling ; but always made it up after a short time, until the following occurrence took place :—

Quarrels. Mae Sahab, Ahmed Yar Khan, Meer Eltaz and their party, determining to have a struggle for sole power, proposed to connect themselves by marriage with the Talpoor family of Sindh, at the head of which there were the four brothers, Ghulam Alee, Karam Alee, Murad Alee and Futteh Alee.

Intrigue. Mae Sahab and Meer Ahmed Yar Khan set out for Sindh, and gave to Meer Karam Alee in marriage Bibee Fatimah, the sister of Ahmed Yar Khan. The Meer in return, gave as a settlement the district of Shahdadpoor and two thousand rupees, and gave Mae Sahab great hopes of support to her cause.

Marriage. This ill-judged match disgusted Meer Mahmood, Mustafa Khan, and the whole of the Brahoees, and even the friends of Mae Sahab equally ; the Talpoors being considered a very low tribe, as the following Baloch verse will shew :—

<i>Verse.</i>	<i>Translation.</i>
Kedds, Gabal Godhai Pachalo, Talpoor Bewakai Maree. Durust Ghulam-i-Chakare. Banadi Bashkathaga. Datk-Nazurth Hadaiya.	Kedds, Gabols, Gadhais, Pachalos, Talpoors and lawless Murees. All were slaves of Chakar, (Rind,) with Banadi (his daughter) as a dowry he gave, Hadaiya (his son-in-law) would not have them.

Deputation. Mustafa Khan, Akhund Tutteh Mahommed, and naib Abdu Rahman, were deputed to Candahar to interest the king in revenging this insult. They had already a friend at court in the wuzeer, Sher Mahommed Khan. They offered to conduct the king through the Bolan Pass, (an offer never before made) and to assist him in collecting the arrears of tribute. They also gave Meer Mahmood's daughter, Bibee Emnah, to the king's eldest son, the present prince, Timoor.

On Shah Shuja's arrival at Shikarpore, he devastated the country

on this side the Indus, and compelled the Ameers, after a great deal of hesitation and evasion, to pay the sum of twenty-four lakhs of rupees, as arrears of tribute: three more lakhs being spent in fees and presents to the courtiers. The Talpoors grateful for no heavier penalty, vowed twelve thousand rupees worth of silver to adorn the doors of the shrine of Sal Shahbaz at Dehwar. The Talpoors then entered into a treaty with Mahmood Khan, and expelled Mae Sahab from their territory. The Khan then accompanied the king on his way to Dera and Peshawur as far as Dagal, and thence returned to Kalat.

Meer Mustafa Khan and Mahommed Raheem Khan were deadly enemies. Mustafa Khan resided at Bagh, and Mae Sahab at Kotdo, and the former was in the habit of going on weekly visits to the latter, with a few horse, for the purpose of hunting in the neighbourhood, at Futtehpoor. During one of these hunting excursions, Mahommed Raheem Khan happened to be hunting in the same neighbourhood, at Panjak. On hearing of the proximity of his brother and enemy, he abandoned the hunt, and proceeded with his few followers to attack his brother: an engagement took place. Mustafa Khan was killed, and Mahommed Raheem fled to Dajal, where naib Sadar was acting for Mustafa Khan; and after sacking this place he retired to Janpoor near Dera. Mae Sahab took the corpse of Meer Mustafa to Bagh, and built a splendid mausoleum over it. Mustafa Khan left one son, Sarfraz Khan, a daughter Bibee Ganjan, and two widows, Bibee Ganj-Khatoo, sister of Meerulla Khan; Raisanee, and Bibee Hazaree, daughter of Meer Hasal Khan Shahwanee. During these transactions, Meer Mahmood was at Kalat.

Mahommed Raheem, not being able to rest at one place, was brought by his evil genius again to Panjak, and to the neighbourhood of Mae Sahab, who burned to revenge the death, not only of a brother, but it is whispered, of a lover. She stole upon him one day while asleep, attended only by a slave, Baloch, who was shampooing him, and her attendants immediately despatched him, after a short resistance. The corpse was brought to Gundava, and afterwards sent to Baghbana. He left no family.

Meer Mahmood had now nothing to fear: but this independence came too late, for disease was making great inroads on his constitution. He at last fell a victim to *zabitus*, a disease brought on by venereal excesses, while yet a young man, having reigned 24 years. He left three wives, one concubine, three sons, and one daughter. Meer Mahommed Mehrab Khan, Meer Mahommed Azam Khan and Bibee Emnah of one mother; Bibee Sakhee, a Shaezye Mogul. The third son, Maddat Khan, of the concubine, died at an early age.

Mae Sahab died in the reign of Mehrab Khan, of a stroke of a hot wind, in the Moola Pass.

When Meer Mahommed Mehrab Khan succeeded his father, he had arrived at years of discretion.

At the time of Mahmood's death, Shahzadah Kamran was at Candahar, and Munsoor Khan was governor of Shikarpoor. Akhund Futteh Mahommed lost no time in repairing to the latter place, and in persuading the Khan to accompany him back to Kalat, where assisted by the Brahoee chiefs, he installed Mehrab Khan on the part of the king, chief of Kalat; notwithstanding the opposition of Mae Sahab, the Eltazyes, and Meer Ahmed Yar Khan, who wished to declare the latter.

When Mehrab Khan, after his installation left Cutchee, and was returning to Kalat, Mae Sahab took Ahmed Yar Khan, and retired with him to Shawl, the place of Ahmed Khan Magasee, and collected a force of Chandyas and other Brahoees. Mehrab Khan on the other hand, collected a force at Gunjaba, and encamped at Panjak. No engagement however took place, and matters were peaceably arranged by Akhund Futteh Mahommed and naib Abder Rehman. Mae Sahab and Ahmed Yar Khan accompanying the new Khan to Kalat, Abder Rahman was left behind as governor of Cutchee; and wukeel Futteh Mahammed had otherwise the sole direction and management of affairs. After some time, however, Mehrab Khan entrusted the management of affairs to his mother, Bibee Sahtee, and her manager again was Meer Abdul Kadir, son of naib Abder Rahman, who soon supplanted his father, and led Mehrab Khan into every kind of debauchery. Some of the Khan's slaves, such as Meero and Mubarak, made a point of praising

their patron to Mehrab Khan in private. About this time Dad Mahommed Umarzye Ghilzye came into notice ; he was one of the *peshkidmats* of Mehrab Khan, and kept the seal with which the daily order for rations was sealed. This man, in the time of Mahmood, was dog-keeper to the young Mehrab, but getting into a scrape about an intrigue with one of nurse Beebo's slave girls, fled, and took service with Hajee Barat. He was once employed in collecting the revenue of Dajal. Mulla Fakeer Mahommed, a *khanahzad*, was the manager of Kalat, and kept the dafturs ; Darogah Gul Mahommed and Shahghassee were of no note.

Akhund Futteh Mahommed still continued to serve faithfully ; although superceded and surrounded by enemies, the foremost of which was the Khan's mother. For fear of her, it is said, the wukeel was often afraid to go to his house at night, and slept by the Khan.

Although Mulla Abdul Kadir used to interfere in the wukeel's province, he always desisted when complaints were made to the Khan. At last the following enemies of the wukeel conspired together and determined to attempt his ruin : they were Mullah Abdul Kadir, Meer Eltaz, Meerulla Khan Raisanee, and some Ghulams.

Meer Mubarick, the son of Mullah Futteh Mahommed, and Meer Kadir Bakhsh Zahree, chief of Jhalawan, his son-in-law, were both (unknown to each other) enamoured of one of Mullah Futteh Mahommed's slave girls.

The conclave therefore first made a disclosure to each party of the other's successful amour, and thus succeeded in making them deadly enemies. At last in the month of Ramzan, when Meer Mubarick was

performing ablution in his own room, Kadir Bukhsh stole upon him, and killed him : and then fled to Bibee Lal Baiee Eltazye, widow of Meer Mahmood Khan, (his own mother being an Eltazye,) where he remained in concealment three days. These same chiefs, after Meer Mubarick's death, importuned the Khan to kill Kadir Bukhsh, to avenge the blood of Meer Mubarick. Their object was to involve Meer Futteh Mahommed, in a bloody feud with the Zahrees, and to deprive the Akhund of the powerful influence of such a son-in-law. Meer Kadir Bukhsh was accordingly killed, in the Meeree of Gundava, while

Death of Meer Mubarick.

Death of Kadir Bukhsh.

bathing, and his corpse was taken to Zahree, by Taj Mahommed Zahree, his cousin.

Akhund Futteh Mahommed, by the counsel of the Zahrees, and consent of the Khan, then set out for Candahar, to sue for revenge: Shazada Kamran appointed Sirdar Poordil Khan Barukzye to accompany the wukeel, and to carry out his views in respect to Abdul Kadir and Meer Eltaz. Wuzeer Poordil Khan. Futteh Khan was a friend of the Akhund's.

On Kamran starting for Herat, Poordil Khan set out for Dadar; on arriving there, he suggested to the wukeel that they should commence destroying naib Abdu Rehman's property, but the former would not consent. They then proceeded to Gandava, and Poordil Khan proposed the seizure of Abdu Rahman: but the Akhund again refused his consent.

This wavering and repenting annoyed Poordil Khan, and caused him to accept the overture made to him at this time by naib Abdar Rahman, accompanied by a bribe of thirty thousand rupees, and no doubt the Akhund would soon have had cause to repent his lenience, had not, at this time the news arrived of wuzeer Futteh Khan being blinded. On receiving the intelligence, Poordil Wuzeer Futteh Khan. Khan immediately set out for Candahar, and the deaths of Mulla Futteh Mahommed's son and son-in-law remained both unavenged.

Mae Sahab, Ahmed Yar Khan and Sirdar Khan Rind, again rebelled, and took up their quarters in Sawee; having gained over the Khajaks. Mehrab Khan collected a force, and marched against them. Mae Sahab stood a twenty day's siege, and then made a conditional surrender, and with Ahmed Yar Khan, and Sarfraz Khan, the son of Meer Mustafa, accompanied Mehrab Khan to Gundava. Meer Ahmed Yar Khan having first sent his wife and two sons to Sagan.

Merab Khan tried for a long time to get Admed Yar Khan to send for his two sons; but his friends persuaded him not to trust Mehrab Khan. At last, unable longer to resist the latter's importunities, the sons were sent for, and the whole party left Cutchee for Kalat.

Mulla Abdul Kadir despatched one Dadulla Khan to Candahar, to Poordil Khan, whom naib Abdar Rahman had secured in his interest,

by the thirty thousand rupees' bribe, and got him to address letters to Mae Sahab and Ahmed Yar Khan, in answer to supposed proposals made by them, to the effect, that " their letters had been received by

Plot.

Poordil Khan, who recommended them to pursue the course they had adopted, and promised that he would start with a force as soon as their plans were matured."

These letters were shewn to Mehrab Khan as intercepted ones ; and in proof of the treachery of Ahmed Yar Khan. Merhab being loathe to believe it ; other letters were procured and shewn, the Khan believed them to be genuine, and Kulla Abdul Kadir, Meer Eesa Khan Mongul, Dad Mahommed Gilzye, and Meero Ghulam, did not hesitate to advise the Khan to do away with both Ahmed Yar Khan and Sarfraz Khan, who at last agreed to it. Accordingly in the month of Rujab, one day early in the morning, Meer Ahmed Yar Khan was summoned before Mehrab Khan, being at the time an invalid, and cut down in the

Deaths of Ahmed Yar Khan and Sarfraz Khan.

presence. Meer Sarfraz was then sent for, they found him reading the *koran*, which book he brought

to the presence with him, and by it intreated

Mehrab to spare his life. His intreaties were of no avail, he was slaughtered on the spot, Meer Eesa Khan striking the first blow. Mulla Raiee, Shahghasee Barfee, and fifteen others of the deceased's attendants were killed at the same time. Ahmed Yar's sons, Meer Shahnawaz and Meer Futteh Khan, with their mother were confined ; and they remained under strict surveillance for near twenty years. These murders were committed at Gundaba : and Mehrab Khan returned to Kalat, leaving Mulla Abdul Kadir governor of Bagh.

On the march, and in the absence of the above, Dad Mahommed and

Meer Eltaz.

Meer Eltaz completely gained the confidence and trust of the Khan, who soon after married Bibee

Magany, the daughter of Meer Eltaz ; and made the father his manager, Dad Mahommed having in reality all the power.

Mulla Abdul Kadir, thus finding himself supplanted, appropriated to himself about a lakh of rupees of the Cutchee collections ; and proceeded to Kahnak and joined Meerulla Kaisanee. Mehrab tried to coax him to Kalat, but Poordil Khan and the Kakers some time dissuaded him. At last his father, Abdu Rahman, wrote him a letter ; and among other affecting appeals, begged him not to prove false to

the shade of Nasseer Khan ; unable to withstand these intreaties, he set out, and having reached Manyochar, sent and requested that a respectable man might be sent from Kalat to meet and reassure him. Kueen Khan Zahree and Mulla Futteh Mahommed Khanazad were deputed with secret instructions to murder him, which they did ; the

Murder of Abdul father, Abdu Rahman, being murdered at the same
Kadir and Abdu Rah-
man. time at Kalat. The family property was confiscated, and some time afterwards, Meer Yar Mahommed Shaezye Mongal removed the family to a place of safety at Wad.

During this time, the Baloches of Cutchee were committing great de-
Death of Meer Eltaz. predations ; and when Mehrab Khan was on his way to that district, Meer Eltaz died, having been sahabkar, or manager, only one year.

In the Duranee history, Mehrab Khan is only mentioned once as
Duranee History. having paid his respects to Mahommed Azeem Khan Barukzye and Ayoob Shah in 1820, when on their way from Candahar to Shikarpore ; at which latter place Shah Shuja was.

On the death of Meer Eltaz, Dad Mahommed became all-powerful,
Dad Mahommed. but he did not make a discreet use of his power ; for he was in the habit of treating the Brahoee Sirdars with disrespect, deriding their appearance and peculiarities of manner in public durbar.

His assumption so disgusted the Sirdars, especially those of Sarawan, that they deputed Sayad Mahommed Shareef to Candahar, offering all to pay their respects to the chiefs of that province, if they would promise them their assistance.

Sirdar Sher Dil Khan wanted to get Shikarpore from the Scindians :
Defection. he therefore treated the Sayad with great distinction, and he was despatched with an agreement and a dress of honor. The whole of the Sarawan chiefs then repaired to Candahar, and received dresses of honor.

Mehrab Khan, in great alarm, despatched Myan Sibaghatulla to
Deputation. Candahar, to make a treaty with the chief Poordil Khan, and to persuade the Sarawan chiefs to return to their allegiance. At the time of his arrival, Sher Dil Khan had advanced two stages, as far as Dae, but was obliged to return, from sickness.

A sham treaty was concluded, which provided for the removal of Dad Mahommed, and the appointment of Futteh Mahommed to be wukeel; Sayad Mahommed Shareef, to be naib of Dajal; Mahommed Khan Shahwanee, to be naib of Dadar; Misree Shaezye Mongul to be naib of Shawl; Arif Khan Mambaranee to be naib of Mustang, and 60,000 rupees of the year A. H. 1234 to be paid, (nominally to defray the expences of dresses and entertainment to the Brahoes.) The Sarawan Brahoes required the Khan's brother Mahommed Azam, wukeel Mahommed Sideek, Meer Rasheed Zahree, and Meer Eesa Khan Shaezye Mongul, to come to Candahar to coax them back to their allegiance. The Sirdars despatched Mulla Abdul Ghyas in company with the Sahabzadah back to Kalat. The latter commenced intriguing with Mahommed Sideek Khan, and the other enemies of the Khan. These comprised the whole of the Brahoee chiefs, with the exception of Wulee Mahommed Mongul and Ahmed Khan Magasee, who with one consent determined on killing Dad Mahommed, even should no other opportunity be afforded them than in the presence of the Khan.

A few nights after the return of Sibaghatulla to Kalat, Mehrab Khan sent for wukeel Futteh Mahommed, and requested him to proceed to Candahar instead of Mahommed Sideek, who was an enemy of his; to this proposal the Akhund did not agree, and Mehrab Khan slightly annoyed, said, "Then you had better put your hands and feet in henna, and I will go myself." The Akhund was either playing a double part, or was led away by the Eltazyes, Eesa Khan, Meer Booheer, Rusheed Khan. Mahommed Khan Rind to regard the Khan's allusion to the red dye, as a threat to kill him be—either the true reason, he certainly immediately joined and headed the malcontents.

Towards the evening of the next day, the whole of the Brahoes openly rebelled, and drew up on the road to Iskalko the Shahwanees. Mehrab Khan moved out, and encamped in front of them, with the Ghulams, or slaves, the Babees, and the town and suburb people, attended by Wulee Mahommed Mongul and Ahmed Khan Magasee. Myan Sibaghatulla with the Khan's consent

brought his mother, and put her down between the confronting forces. This of course was a signal for a truce. Until midnight, the Sahabzada Sibaghatulla vainly endeavoured to reconcile the parties, and Mehrab Khan retired into the citadel: and the Sahabzada succeeded in getting his friend, the wukeel's family, out of the town.

Next day, the Sahabzadee Sayad Jamal Shah, Nazar Juma, Meer Jam Alee, and Meer Yakoob Khan Eltazye, were sent on a deputation to the rebels, with the following proposals; viz. that Dad Mahommed should be deposed and made over to them for execution, banishment, or pardon; that the Akhund should occupy his place; and that they should all receive their former jaghirs. To these terms the rebels would not agree, saying, they had no faith in the Khan's promises or oaths regarding Dad Mahommed. On the Khan's deputation returning, Meer Kamal Khan, Meer Rusheed Khan, and Meer Yakoob Khan remained behind, the former was the last; on nearing the walls of Kalat a chance shot was fired by one of Ahmed Khan Magasee's men, and Meer Rusheed Khan returned to the rebels on the pretence that the shot was fired at him.

The rebels moved off for Soherab, and Mehrab Khan sent Jam Alee to try and make terms. He also remained in the rebel camp.

The Khan at last in despair, despatched Hajee Barat, Meer Gul Mahommed Ghilzye, Deewan Khemchund, and Sibaghatulla to Candahar, with Mullah Ghyas, the Khan's mother, and the stipulated 60,000 rupees.

On the night of the rebellion of the wukeel and the Jhalawan chiefs, Mulla Ghyas received intelligence of the death of Sirdar Sher Dil Khan at Candahar.

On the embassy arriving at Kahnak, the tribes of Sarawan assembled, and tried to prevent the Mae proceeding to Candahar. Mae Naz Khattoo, niece of the Khan's mother, and wife of Mahommed Khan Shahwanee interceded, and prevented the detention of the embassy.

Poordil Khan, on hearing of the approach of the embassy, left Candahar and encamped at Dae, that it might be thought he was prepared to take severe notice of the delay made by Mehrab Khan, in sending the deputation according to treaty; at the first interview therefore, although Poor Dil Khan receiv-

ed Maeë Sahab with great courtesy, the delay was severely censured ;
 and the Khan insisted on the payment of three lakhs
 Increase of Tribute. instead of 60,000 rupees. This being agreed to,
 Poordil Khan offered, before the payment of the money, to put a
 force at the disposal of Maeë Sahab, to punish the refractory wukeel
 and rebels of Jhalawan. She however proposed returning to Candahar
 with the Khan, from which place, dresses of honour were immediately
 despatched for Mehrab Khan and Dad Mahommed.

On terms being made with Poordil Khan, Mehrab Khan again sent
 proposals to the rebels in Cutchee ; and Mahommed Sidick
 Terms. Khan, Meer Rusheed Khan, and Meer Kamal Khan proceed-
 ed to Kalat, on it being promised that Dad Mahommed should be
 given up to them, and that their jaghirs should be restored ; however,
 on their approaching Kalat, Mehrab Khan furnished Dad Mahommed
 with 1,000 ducats and sixty horses, and told him to take refuge in
 Noshky. From this place Dad Mahommed despatched his father, Sher
 Reception. Mahommed to Candahar, with an offer to come and pay
 his respects to the Sirdar, and he in person, immediately
 followed, and was received with great distinction.

The deputation remained five months in Candahar, and started on
 its return in the winter, accompanied as far as
 Return of Embassy. Shorawak by the Sirdar's son, Meer Afzal Khan, and
 the whole way by Juma Khan Burikzye. The Sarawan chiefs also
 returned to their country, and Sibaghatulla and Khemchund were
 detained as security for the payment of what remained of the three
 lakhs. Mehrab Khan would not see his mother for a month after her
 arrival at Kalat, pretending to be offended at her having agreed to the
 payment of the three lakhs, and Dad Mahommed remained at Giranee
 at the Khan's request.

The Khan then sent his mother to Cutchee, to reconcile the rebels.
 Failure to Nego- They would not listen to terms, and Mahommed
 tiation. Sidick and Meer Rusheed Khan also left Kalat, and
 proceeded to Cutchee in disgust.

After the winter was over, and the spring harvest reaped in
 Cutchee, the rebels proceeded to Khozdar, and threatened to continue
 their contributions in the direction of Mech. Kehrab
 Surrender of Khan seeing his overthrow approaching, proceeded
 Mehrab.

with a few attendants to Khozdar, and threw himself on the mercy of his wukeel.

After reconciling the rebels by such degrading proceeding, Mehrab Khan sent for Dad Mahommed, reinstalled him, after giving him a dress of honor, and going through the mockery of sending him to the Akhund.

Mehrab Khan according to the treaty with Poordil Khan, appointed the naibs of the latter's nomination; but soon after deposed them. This and the reinstallation of Dad Mahommed rendered the treaty with Candahar null and void. Sayad Dajal sold. Mahommed Shareef, naib of Dajal, had already sold the district to nawab Bahawal Khan.

The death of Meerulla Khan is one of the events that mark the reign of Mehrab Khan. It occurred in the following manner: He was a Raisanee by tribe, and son of Mulla Mahommed, the mother of Sarfraz Khan; Bibee Ganj Khatoos was his half sister, and the mother of Abdul Kadir, Bibee Sahto, was his niece. On this account he was an enemy of Dad Mahommed, who caused their deaths; and Dad Mahommed aware of this, continued to prejudice the Khan, who had now become completely his dupe, against him. At last Meerulla Khan was sent for to the Meeree, under pretence of his counsel being required, and there, in the presence of the Khan, was murdered. Yoosuf Khan and Meer Zungee Raisanees were killed near the mosque outside of the citadel, and Sakeer Mahommed was killed in his own house in the town. Mehrab Khan that night pitched his camp towards Mhozdar, preparatory to proceeding to Cutchee.

These murders spread the greatest consternation through the country, and in the spring, the whole of the Sarawan chiefs again sought refuge and redress in Candahar. Mohundil Khan collected a force and marched for Balochistan. He arrived at and ravaged Shawl, Seeree, and Pilingabad. Mehrab Khan, after great delay, collected an ill-organized force, and marched for Kustung. At Shiree-nab, the two advanced guards met, and an engagement ensued, in which the Brahoee troops suffered themselves to be defeated.

Mehrab Khan, discovering an extensive and dangerous defection among his troops, was forced to buy off the Candahar force for forty, thousand rupees in A. H. 1234, and to give Meerza Gul Mahommed, as security for the payment of the money in Candahar. Rohundil Khan having procured satisfaction for himself, returned to Candahar, leaving the Sarawan chiefs at the mercy of Mehrab Khan.

Dad Mahommed seeing his influence declining, and becoming daily more unpopular, determined to connect himself by marriage with the Brahoees. He first took the daughter of Rais Khan Mahommed Dehwar. He next proposed for the daughter of Meer Misree Shaezye Mongul, but was refused. He then took the daughter of Essa Khan Shaezye Mongul, and the daughter of Wadera Jan Mahommed Bangulzye for his brother Khan Mahommed. He also made overtures to get up a party of the following; viz. Meer Wallee, Mahommed Khan, Ghulamzye Mongul, Meer Fazal Khan Zagar Mongul, Ahmed Khan Magasee, and Meer Bijad Keerwanee of Kech, and at Candahar with Mama (Khuda Nazar Khan Ghilzye,) and through him with Sirdar Rahamdil Khan.

The reason for his conciliating Meer Bijad, was to secure Kech as a place of refuge, in case of his being disgraced at court.

Day by day Dad Mahommed became more powerful, till at last the Khan himself was not looked up to, and the former collected the revenue, and disbursed it as his own caprice dictated; he even proceeded so far, as to give the Khan insulting answers, and to mimic him, and to boast to his face that he had the power of deposing him. He was in the habit of withholding the household expences for months together, and the Khan dared not remonstrate; he sometimes would not rise, when Mehrab entered the durbar.

The Khan's eyes were at last opened, and he determined on ridding himself of Dad Mahommed, and broached the subject to naib Mahommed Hasan, Shahghasee Noor Mahommed, Mahommed Sideek wukeel, Abdul Kareem Khan Raisanee, and several others. The firmly rooted infatuation of the Khan was, however, so well known to them, that they would not believe him, when he told them he wished Dad Mahommed's death.

For a whole year he failed to convince them, till at last when the winter approached, and the time for the court moving to Cutchee arrived, the Khan as usual, requested Dad Mahommed that the funds necessary for the preparations should be produced. Dad Mahommed put the Khan off from day to day, (and it is said, that the tents

Dad Mahommed's assumption. remained pitched for two months,) and at last flatly refused the funds. Mehrab Khan no longer able to bear with this assumption, sent for Dad Mahommed to the Meeree, and high words were exchanged. Mehrab Khan rising and retiring, and Dad Mahommed doing the same, to the suite of rooms occupied by the Khan's mother, for the purpose of performing ablution before saying prayers.

Naib Mahommed Hassan and wukeel Mahommed Sideek, with others of their party, had some time before consented to attempt the life of Dad Mahommed, who was aware of their intentions, but doubted their daring.

As the latter was performing his ablutions as above mentioned, naib Death of Dad Mahommed. Mahommed Hassen stole stealthily behind him, with a drawn sword, and cut him down. Shahghassee Noor Mahommed following the example.

When I first met naib Mahommed Hassan at Hustung, in June 1838, with Sayad Mahommed Shareef, the latter Boast. praised the bravery of the former, as displayed on the above occasion; and pointed to the identical sword with which the deed was done, and which hung by the naib's side, with great pride.

Dad Mahommed's property, to the amount of from four to five lakhs, was confiscated; but it was thought that a great quantity had been concealed, and Mahommed Hassan was appointed naib, and Mahommed Sideek wukeel, with all the honors. Appointment. The Khan however thought and acted for himself, kept his own seals, and had his accounts kept by a Hindoo, by name Deewan Bachamal.

When Shah Shuja was besieging Candahar in 1834, Meer Shahna- Escape of Shah-nawaz and Futteh Khan. waz Khan, and Futteh Khan, made their escape from the Meeree of Kalat, and their flight was not known till next day at noon. On their arrival at Pishing, they met Sirdar Samandar Khan on his retreat from Candahar, where Shah

Shuja had been defeated, and returned with him to his estate of Hanna in the district of Shawl. They then took refuge for a short time in the Kakar country, and then separated; Shahnawaz proceeding to Candahar, where Sirdar Kohun Dil Khan, at the recommendation of Mulla Nassoo Lodeen, for some time afforded him support; and Meer Futteh Khan taking refuge with Meer Rusheed Khan Zahreehere, after some time, having assembled a force, he moved down on Cutchee, and was there joined by his brother Shahnawaz from Candahar. Several

Opposition. engagements took place between them and the Khan's brother, Mahommed Azam Khan, with varying success, until they were completely defeated by the latter at Dadar, and obliged to proceed to their former retreats.

Mehrab then moved a force against Rasheed Khan, and demanded Meer Futteh Khan. that his protegé, Futteh Khan, should be given up. This Rasheed Khan refused. At last, at the mediation of the Brahoees, Futteh Khan was given up to Meer Walee Mahommed and Raheem Khan, to keep. Mehrab Khan then tried to bribe them, to deliver up their charge to him; but found they had too much honor for him. For they not only refused thus to dishonor themselves, but assisted Futteh Khan in making his escape to the Sasolees, from which tribe he retreated to Sinde, and took protection with his aunt Bibee Fatimah at Hyderabad, where he got addicted

Pursuits of the to low pursuits and debauched habits, as did his
Brothers. brother Shanawoz, at Candahar, who on that account, was neglected by Kohundil Khan, and reduced to great distress.

Shah Shuja on his defeat, retreated via Lash, Seistan and Shorawak.

Shah Shuja. On his arrival at the latter place, the Sirdars became aware of his proximity, and fitted out a "chapao," under Raham Dil Khan, for his pursuit and capture; which latter was so nearly being effected, that before the rear of the king's baggage had left the ground at Mungochar, the advance of the pursuing party

Pursuit. reached it, and succeeded in capturing some baggage ponies. The Shah, on his arrival at Kalat, sought the tent of Mehrab Khan, and threw himself on his protection. The Khan re-

Escape. ceived him with great honor, and all the deference due from a vassal to his sovereign.

On leaving Mehrab Khan, scarcely had his majesty reached his own suite of tents, when Jan Mahommed Khan Kuzzalbash arrived on the part of Sirdar Raham Dil Khan, to demand the person of the king.

His Majesty, in the greatest alarm, sent Mehrab Khan a golden hookah, and five hundred gold mohurs, by Kazee Mulla Hassan Peshawuree; but the Khan, contrary to the advice of menials, returned them; and then, contrary to the advice of his courtiers, told Jan Mahommed to tell Raham Dil Khan, "If he wanted his friendship, to refrain from his demand; as he was prepared to sacrifice his life, property, country, and tribe, in the service, or at the feet of his lawful king." On Jan Mahommed taking his leave, and after the king had halted for some time at Kalat, the Khan furnished him with respectable men to accompany him to Bagh. On his arrival at the latter place, he heard of the death of Samundar Khan at Siwee, and therefore proceeded without delay to Shikarpore.

But to proceed from these events to those of the year 1838. On the 15th January of that year, I arrived at Candahar on a mission to the Sirdars, the object of which was to detach them from an alliance they were on the point of entering into with Persia; and in which I found Mehrab Khan was prepared to join them, notwithstanding he had sent an embassy avowedly to consult with them on the method of relieving Herat.

In order to make known the Governor General's declaration, that the British Government acknowledged and respected all the different holders of power in Afghanistan, I addressed a letter direct to Mehrab Khan with the consent of Raham Dil Khan. Sometime elapsed before I received an answer, and I only heard, that Mehrab Khan was piqued at Raham Dil Khan being made privy to our correspondence. Notwithstanding this, I afterwards discovered, that the delay in receiving an answer to my letter was occasioned by the Khan writing from Kalat to Candahar, to consult the Sirdar, regarding the style of answer he ought to return. This shews, that the supremacy of Candahar was acknowledged by the Khan.

On it becoming necessary for Sir Alexander Burnes, in April 1838, to break off all intercourse with Ameer Dost Mahommed, and to proceed direct to Peshawur, I was ordered direct to Shikarpore by the Bolan route.

On my arrival at Shawl in June, the Bolan route being reported impassable by the Governor of Shawl, on account of the hot winds, and knowing that the Governor General when he originally organized our mission, intended it should visit Mehrab Khan on its return to Hindosthan, I determined on getting invited to Kalat, to wait till the end of the hot weather. Having procured the necessary invitation, I proceeded to Kalat, where I held constant intercourse with the Khan for three months.

Before I became aware of the intention of Government to restore Shah Shuja, he foresaw that it would take place, and became very anxious to conclude a treaty with the British Government, saying, he was favorable to the Shah's cause, not from choice, for the king had never since he left Kalat expressed his gratitude for his safety, which he owed, after Providence, to him, but from necessity; for the protection he had afforded to the fugitive Sadozye monarch had made Events of 1838. deadly enemies to him, of the Burikzye faction, which now ruled Afghanistan.

Whilst at Kalat, I constantly wrote to Government, pointing out the value of the Khan's friendship, in case an army advanced by the Bolan route; but although while at Kalat, I received intelligence of the intention of Government to restore Shah Shuja, yet, I was ordered to keep it a profound secret.

The hot weather having past, and having yet received no authority to remain at Kalat, I started for Shikarpore; on my arrival at Soherab, I received a letter authorizing me to make the Shah's restoration public, but containing no instructions to remain at Kalat. These however at last reached me some days after my arrival at Shikarpore; and I had scarcely completed my preparations to return to Kalat, when I received a letter from Sir Alexander Burnes, saying, he had been appointed envoy to Kalat, and requesting I would delay my departure. I joined Sir A. Burnes at Roree, and he became so taken up with commissariat arrangements, in which he required my assistance, that he delayed either proceeding himself, or deputing me until it was too late.

Treaties had been concluded with the Ameers of Sinde, and the Nawab of Bhawalpore, and Mehrab Khan was called upon to allow supplies to be laid in Cutchee, and to procure camels. He laid obstacles in the way of the former Events of 1839.

being done, and made excuses for not doing the latter; saying, a treaty should be made with him, as had been made with the Ameers of Sinde and the Nawab of Bhawalpoor, to both of whom he considered himself superior, as he had never been tributary, as they had, to the Sodozye kings. A treaty was refused, and after the march from Shikarpore of the army of the Indus, Sir A. Burnes proceeded to Kalat, to purchase supplies and bring Mehrab Khan to pay his respects to Shah Shuja at Shawl; both of which objects he failed to accomplish, and the districts of Shawl and Cutchee were declared forfeited by the Khan accordingly.

The army advanced on Candahar and Cabool, and Mehrab Khan having been convicted of annoying detachments frequenting the Bolan Pass, by means of the Brahoee and other tribes inhabiting the neighbourhood, his deposition was determined on; and the Bombay column, under General Wiltshire, on their return, took the fortress of Kalat by storm on the 13th November, 1839.

Just before the citadel was stormed, and he was killed, Mehrab Khan sent the following message, with a matchlock, to his son by darogah Moosa: "Tell my son that both myself and my wealth have past away and become sin-offerings for him; give him this matchlock, that has descended as an heir-loom from his forefathers. Tell him to keep it, and bear it on his shoulders; and he will one day be Khan of Kalat. Tell him not to be guided by the counsel of the Brahoees, and not prematurely to oppose Shahnawaz Khan."

Mehrab Khan, in his lifetime, gave two of his daughters in marriage to two sons of Meer Karam Khan Eltazye; and for his son, the young Nusseer Khan, he engaged the daughter of Meer Rusheed Khan Zahree.

The following will shew that Mehrab Khan repented of the murderous policy he had pursued.

In durbar one day in August 1838, wishing to prove, if what I had heard of his cruel disposition was true, I remarked, that the Afghans and Baloches could only be ruled with a rod of iron. "I thought so too," replied he with a sigh, "and many a chief have I had butchered beneath this very window at which we are sitting; but I was wrong, and I have lived to know it."

*Proceedings of the Asiatic Society.**Meeting of Wednesday Evening, 7th June, 1843.*

The usual monthly Meeting was held at the Society's Rooms at half past 8 P. M., the Rt. Rev. the Lord Bishop in the chair.

The following gentlemen proposed at the former Meeting, were balloted for and declared duly elected :—

R. CUST, Esq. C. S. and J. E. L. BRANDRETH, Esq. C. S.

The usual communication was ordered to be made to them.

One new Member was also proposed; viz.

J. W. FULTON, Esq. Barrister at Law. Proposed by Major E. POTTINGER, seconded by Captain BROOME.

The following Books were presented, and purchased :—

Books received for the Meeting of the Asiatic Society, on the 7th June, 1843.

The Calcutta Literary Gleaner, May and June, 1843. Vol. ii, Nos. 3 and 4.

Presented by the Editor.

The Calcutta Christian Observer, June, 1843, Vol. iv, No. 42. Presented by the Editor.

The Oriental Christian Spectator, second series, May 1843. Vol. iv, No. 5. Presented by the Editor.

Edinburgh New Philosophical Journal, by Professor Jameson. Edinburgh, 1842, Vol. xxxiii, No. 66. Presented by the Editor.

Journal of the Royal Geographical Society of London, 1842, Vol. xii, pt. i.

Proceedings of the Geological Society of London, 1842. Vol. iii, pt. ii, No. 87.

Presented by the Society

Journal des Savants, September, 1842. Paris. Purchased.

The Chemical Gazette, or Journal of Practical Chemistry. London, Nov. 1842.

No. 1. From the Editor

London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science. 3rd series. Vol. xxi, No. 138 and 139. From the Editor.

Observations sur la Peste du Levant, et sur la vertu spécifique de l'Huile d'Olive, par J. G. de Hemso. Florence, 1841. Presented by the Author.

Hemso, Degli ultimi Progressi della Geografia. Milano, 1841 and 1842. Presented by the Author.

Pratt's Mechanical Philosophy, 2d edition. Cambridge, 1842. Presented by the Author.

Goodwyn's Memoir on the application of Asphaltic Mastic to Flooring, Roofing, and Hydraulic Works in India. Calcutta 1843. Presented by the Author.

Goodwyn's Memoir of an improved System of Suspension Bridges, on the principle adopted by Mr. Dredge. Calcutta, 1843. Presented by the Author.

Newbold's British Settlements in the Straits of Malacca. London, 1839. 8vo, 2 vols. Purchased.

Drawings of the Gates of Somnath and of the Tomb of Mahommed of Ghuzni were exhibited to the Society, before being sent for publication in the Journal.

Read the following letter from Dr. HÆBERLIN :—

H. PIDDINGTON, ESQ.

Sub-Secretary of the Asiatic Society.

MY DEAR SIR,—I have the pleasure to acknowledge the receipt of your favor of the 2nd instant, along with a letter of Mr. Koenig of Bonn, and one of Dr. Roer, the Librarian, respecting a selection of Books to be sent to Bonn, and to be received from thence.

I recollect having made a memorandum of the Sanscrit works proposed to be sent to Bonn for sale, as likewise what works published there should be requested. The lists were approved of, and I believe it was arranged between Mr. Torrens and myself, that I should communicate this to Mr. Koenig ; unfortunately I had not kept a copy of the Memorandum, and after once or twice asking for it, it then appeared to have been mislaid by Mr. Torrens. My weak state of health prevented a more active share in this, as in every other measure of the Society at the time ; and not being in possession of the lists as approved of, I put it aside, and as it often happens, forgot the business altogether.

This is the only apology I can offer for the omission on my part. Mr. Torrens must take some share of the blame, for having mislaid or lost the Memo.

I have often felt the want of a more ready communication between Germany and India, and have some months ago, (in the hope of establishing a regular channel of communication and exchange in Oriental publications,) made proposals to the principal publishers there on the very subject ; and moreover, personal intercourse between an individual on the point of coming to Calcutta and the Booksellers of Leipsig, Berlin and Bonn, being now lost, as an individual member of the Society, I could wish that the subject should be allowed to remain, as it is at present.

The Society cannot conveniently undertake the duty of selling books for Booksellers ; and the works printed in Calcutta could be despatched with greater regularity, and with more chance of meeting with a ready sale, if arranged by those who make it their particular business. This much, as to the proposal to interchange publications with Mr. Koenig.

But the subject, now to my best recollection first revived by Dr. Roer, and likewise mentioned by Mr. Koenig, demands a few words more.

1. It appears from Dr. Roer's letter, that the works sent by Mr. Koenig have been received, but never distributed. (By the bye, I venture to put in a claim for a copy of each.)

2. That no returns have been made. If the value of the Books presented by Mr. Koenig be at all considered (about Rs. 500,) he would be entitled to several copies of all our Sanscrit publications now on sale, and this is an additional reason, why for the present it might be better not to dispatch any Books to him for sale.

I think Mr. Koenig is entitled to, and I beg to propose accordingly:—

- 6. Copies of the Mahabharata, complete,
- 12. „ „ Harriwanso,
- 12. „ „ Raja Tarangini,
- 12. „ „ Naishada,

I thank you for the kind enquiries after my health. I am happy to say, that there is hope of its being restored on these hills, although at present I am still an invalid. If all be well, it is my intention during the approaching rainy season to leave Simla, and endeavor to cross the Himalaya, when I would have an opportunity of visiting the various places in which our late lamented Librarian, Mr. Csoma, lived in true Tibetan fashion. For myself, I do not mean to imitate him in that respect.

Should any thing occur of interest to the Society, it will afford me great pleasure to put you in possession of it.

J. HÆBERLIN.

Simla, 15th May, 1843.

A descriptive list of the coins, lately received from the University of Christiana, with remarks, was presented by Dr. ROER, the Society's Librarian. The list is as follows:—

Descriptive list of the Coins, presented by the University of Christiana, by
DR. ROER.

1. COINS OF THE 12TH CENTURY, ESPECIALLY NORWEGIAN.

A. Coins, bearing the inscription of a single letter.

1. The letter A, inscribed in two concentric circles. R.
2. The same, smaller. R. R.
3. The same with a point on both sides of the letter, and another below. R.
4. A similar one of smaller size. C.
5. The letter B, inscribed in two circles. C.
6. The same with a point to the right. R.
7. The same with a point on either side. R².
8. A similar one, smaller.
9. B. with four points. C.
10. The letter G. R².
- 11-12. Two similar ones.
13. The letter H, surrounded by four points, and the outer circle formed by globules. R⁴.
14. — with a point below.
15. Similar.
16. The same letter with three points. C.
17. M, with a point above. R⁴.
18. N, with a stroke, crossing the middle line. R.
19. R, with a point to the right.
20. The same, with a point on either side. R².
21. S, with a point on either side. C.
22. A similar one.
23. Similar, but the S reversed, and the outer circle consisting of globules.
24. The letter T in its antient shape, with a point behind. C.
25. X with globules in its extremes, and the outer circle also consisting of globules. C.
26. A similar one, with a small line affixed to its upper portion. R.

B. Coins, representing simple Crosses.

27. A Coin, bearing a simple cross, inscribed in two circles.
28. A similar one.
29. A small Cross, the arms terminating in globules. R4.
30. A Cross, with two points. C.
31. A similar one.
32. Another of larger size.
33. A Cross, a point in every angle.
34. A Cross, the foot of which is supported by two oblique lines. R2.
35. A similar one, arms terminating in globules.
36. Another.

C. Coins, representing Patriarchal Crosses.

37. A Patriarchal Cross, arms terminating in globules. R2.
38. A similar one, the foot supported by two oblique lines. C.
- 39-40. Two similar ones.

D. Coins of various types.

41. A Coin, having a spiral line inscribed in it. R3.
- 42-43. Two plain Circles, being concentric to an outer one, which consists of globules, the centre marked by a point. C.
44. A Star, composed of eight 2-horned rays.
45. Obv. A bearded Head.
- 46-51. Six Coins, not distinguishable.
52. Obv. A Building. R. Runic characters.

Frederick I. Emperor of the Germanic Empire. 1152-1190.

53. O. FREDRÆIMPR. The Emperor with a crown, seated; in the left holding out the globe of the empire, in the right a sword; on the left a star.
R. Roma caput mundi. A castle with gate and tower.

Hitolph, Archbishop of Cologne, 1076-79.

54. O. HITARTT PISCOP. The Archbishop seated, with two infula in his right.
R. Colonia. Pais mai. A Castle, with three towers and a gate.

Philip, Archbishop of Cologne.

55. The Archbishop seated, in the right the infula, and in the left a book.
R. Sancta Colonia.

II. Norwegian Coins, previous to the accession of the Oldenburg dynasty.

1. Ob. Olaw D. Gra. Archep. Nid. En.
R. Sanctus Olaw. This is a coin of Olai Lunge, late Archbishop of Norway.
2. A Coin of the Interregnum in Denmark of 1448.

*III. Coins of Danish Kings of the Oldenburg dynasty.**CHRISTIAN I. 1448-81.*

3. Christi. . . D. G. An. R. surmounted by a crown.

JOHN. 1481-1513.

4. Jas. D. G. R. Dani. In the centre of two circles the letter R. surmounted by a crown.
5. The same.

FREDERIC I. 1523-59.

6. Fred...Dan.

FREDERIC II. 1559-1588.

7. Frider...s. II. D. G. Danie. Rev. Rex Norvegie Vanda. Gotor. in the centre Skillingk, Danske, 1630.
 8. The same.
 9. The same ; two Shillings.

CHRISTIAN IV. 1588-1648.

10. Christianus IV. D. G. Danie. Three lions running. Rev. Red. Electus. Norv. Vand. Goto. II. Schillinck Daniske 95.
 11. Christianus IV. D. G. Dan. A lion with the forelegs raised. Rev. Rex. Norv. Van. Goto II. Schillinck Dansk, 1644.
 12. IIII. Shillink Dansk. In the centre D. surmounted by a crown. R. Iustus Iudex, 1644.
 13. Legend the same as the former. The bust of the King bearded and encircled by a Crown. 4 Schilling 1630.
 14.-45. Thirty-two two Shilling Pieces of the same devices and legends as Nos. 10-13, of the respective years, 1594, 1595, 1603, 1604 (2), 1608 (2), 1611, 1613, 1618 (3), 1624, 1625, 1626, 1627 (2), 1629, 1643, 1644 (2), 1646, 1648 (3), 1648 (3), 1645 (3). The year of three Coins not discernible.
 46-50. Five 1-Shilling Pieces of the years 1614, 1624, 1625, 1644. The year of one coin not distinct.
 51. Chris. 4 D. G. D. C4, surmounted by a crown, below 16. Rev. Monos cic. 30. A figure, standing on a globe.

FREDERIC III. 1648-70.

52. Frederic III. D. G. Dan. The armorial signs of Denmark. 1648. Rev. Rex. Nor. Van. Goto. II. Skillinck Dansk.
 53. Legend the same. 1649. A Lion raised on his hind-legs.
 54. Dominus Providebit . surmounted by a crown, 1665. One Shilling Piece.
 55. Frederic 3 D. G. Daniae Rex. Bust of the King, bearded and crowned. Rev. Moneta Nova Gluckstad, XVI. E. Richs. Dal. 1665.
 56-119. Sixty-four 2-Shilling Pieces with similar legends and types as those in Nos. 52-54, of the years, 1648 (2), 1649 (2), 1650 (5), 1651 (5), 1652, 1653 (2), 1654 (4), 1656 (2), 1657 (2), 1658 (2), 1659, 1660 (4), 1661 (2), 1665 (7), 1666 (5), 1667 (9), 1668 (4), 1669 (2), 1676 (3).
 120-30. Eleven 1-Shilling Pieces with similar legends and types from the years 51-61, successively.
 131-145. Fifteen more of the years 1661 (4), 1662 (3), 1663, 1664 (3), 1667, 1668, and two with illegible years.
 145-50. Six 4-Shilling Pieces, with similar legends and types of the years 1665 (3), 1667 (2), 1669.
 151. As 55. 1668.
 152. Fred. IIII. Dei Grat. Head of the King with part of the bust. Rev. Dan. Nor. Von. Got. A crown 8 S. D. M. A. 1700.
 153. Two F. and two 4 joined together. A Crown, above Dominus mihi adjutor.

- Rev. XII. Skilling Danske 1719. The armorial signs of Denmark. G. L. W.
 154-155. Similar to 152 of the years 1703-1704.
 156-58. Similar to 153 of the years 1721 (2), 1724.

CHRISTIAN VI. 1730-1746.

159. Two C. joined to two 6, surmounted by a crown. D. G. Rex Dan. Norv. Va.
 Go. R. 24 Skillinch. Danske. A lion standing, 1734.
 160-161. Two similar ones, 1737.
 162. Ob. the same. R. XII. Skil. Danske for de Amerca Insuler. A ship under
 weigh. 1740. C. W.
 163-64. Fr. Two 2-Shilling Pieces, 1745.
 165-66. Two 1-Shilling Pieces.

The remarks were ordered to be published in the Journal, and the thanks of the Society were voted to Dr. ROER for his communication.

The Secretary stated, that a Supplement to the Monograph on Cuckoos, lately published in the Journal, had been handed to him by Mr. BLYTH, and sent to the Printer.

The Secretary reported the following distribution of the extra copies of Captain EASTWICK'S Scinde Vocabulary, which is printed in No. 133 of the Journal; viz.

- 50 Copies presented to the Government of Bengal.
- 24 Copies presented to the Government of Bombay.
- 24 Copies presented to Captain Eastwick.
- 1 Copy presented to Major Leech.
- 24 Copies presented to the Political Secretariat of the Government of India.
- 50 Copies for sale at Bombay.
- 75 Copies for sale at Calcutta.

A letter from MESSRS. GOULD, with copies of the published numbers of their splendid work, the Birds of Australia, was read, and it was voted, that the Society subscribe for a copy.

Read the following letter from Mr. BLYTH:—

H. TORRENS, ESQ. *Secretary, Asiatic Society.*

SIR,—So much extra work, (that is, in extra hours,) has been performed during the last *two months* by our Taxidermists, that I must again recommend that the Society acknowledge their assiduity by a suitable largess—20 rupees or so divided between them. Let me also warmly recommend that a proposal of Nicholas, (who appears in straitened circumstances, having an often sick wife and child to provide for,) be considered, to the effect that for a small increase of pay he would be glad to devote two or three hours more daily to his work as Taxidermist. It was promised to him on a former occasion that, if he continued to give satisfaction his salary should be further increased, and without at all wishing to disparage the services of our senior Taxidermist M. Bouchez, the inequality of remuneration between him and Nicholas is certainly at present excessive, the one receiving 50, and the other but 20 rupees monthly.

7th June, 1843.

I have the honor, to be, Sir,

Yours most respectfully,

ED. BLYTH.

Extracts from a letter from Major TROYER were read, stating that up to its date, 4th April, he had not succeeded in recovering the lost consignment of the Mahabharata from London. See Proceedings of January 1843, Vol. XII, p. 65, but that some enquiry still remained to be made.

Read the following letters :—

No. 61 of 1843.

From T. R. DAVIDSON, Esq. *Offg. Sec. to Govt. of India, to H. PIDDINGTON, Esq. Acting Sec. to the Asiatic Society.*

Political Department.

SIR,—I am directed by His Honor the President in Council to transmit to you, the accompanying copy of a Report by Dr. W. Jamieson, on the Geology, Zoology, &c. of the Punjab and of a part of Afghanistan.

I have the honor, to be, Sir,

Your most obedient humble servant,

Fort William, 26th April, 1843.

T. R. DAVIDSON,

Offg. Secy. to the Govt. of India.

No. 559.

From the Sec. to Govt. of India with the Govr. General, to H. PIDDINGTON, Esq. *Secretary Asiatic Society, Calcutta.*

Foreign Department, *Secret.*

SIR,—I am desired by the Governor General to transmit to you, a Report by Captain Graham on the resources of Shoa, with a view that if the Society deems fit, it may be published in their Journal. You will be pleased to return the document to the Officiating Secretary to Government, at the Presidency, when done with.

I have the honor, to be, Sir,

Your most obedient servant,

Agra, the 13th May, 1843.

J. THOMASON,

Secretary to the Govt. of India,

With the Governor General.

H. PIDDINGTON, Esq. *Offg. Secy. to the Asiatic Society.*

Ambala, 26th April, 1843.

SIR,—I some time ago drew out a few Notes on Moorcroft's Travels in Ladakh, and on Gerard's Account of Kunáwar, which my immediate superior, Mr. Clerk, thought sufficiently interesting to be sent to the Governor General, and which His Lordship, I have been gratified to hear, has communicated to the Asiatic Society. In some Supplementary Observations on Capt. Hutton's Tour to the Spitti Valley, I make mention of the Gangbal or Snow Fish, and as I have since had a portion of the skin of one sent to me by the Raja of Bisséhir, I have thought that I could not do better than transmit it to you, although it may be that I regard as new what is well known.

I have accordingly dispatched it to-day by Banghy to your address, and as I have not sent any letter with it, I have written in the corner of the packet the word "Gangbal" in addition to my name.

I have the honour, to be, Sir,

Your very obedient servant,

June 5th, 1843.

J. D. CUNNINGHAM.

Ramree, Arracan, 7th May, 1843.

DEAR SIR,—I obtained the enclosed Coin (I imagine) from some of the inhabitants of the Island of Chedooba, who found it with other similar ones in digging, on the sea-shore, a well. I beg to know if it is gold, and if a Coin, what country it belongs to, and of what date?

The Mugs say it is a Coin of some of the Eastern Islands, deposited on Chedooba by the wreck of some boat.

I shall feel obliged by your giving me the above information, and returning me the Coin.

Yours truly,

D. WILLIAMS.

A reply had been addressed to Captain Williams, requesting him to secure one Coin of each sort or more for the Society. The Coin is of very thin gold, and probably an Ancient Hindoo one, though of unknown type. Mr. Piddington presented an Electro-type matrix from it, which he had secured for the Society before returning the Coin to Captain Williams.

The following Memorandum of a work published by Captain Newbold was read, and a copy which had been procured for inspection was ordered to be purchased.

Published by John Murray, Albemarle Street, in 2 Vols. 8vo. with Map and Plans. Price 15 Rs.

A History of the British Settlements in the Straits of Malacca—Penang, Malacca and Singapore.

Comprising a History of the Malayan States on the Peninsula of Malacca, their Government, Religion, Trade, Political and Commercial Relations, Laws, Population, Revenue, Natural Products, Physical Aspect, Geology, &c. By James Newbold, &c. Madras Army.

N. B.—As this work was not published with any view to pecuniary profit, only copies sufficient to cover the expences of publication have been printed.

Read Report of the Curator of Museum of Economic Geology, for the month of May.

Report of the Curator Museum of Economic Geology, for the month of May.

Museum of Economic Geology.—Our active correspondent, Captain Newbold, Assistant Commissioner of Kurnool, forwards to us several specimens of Minerals, to which I shall advert in a future report. We have also received from him, six specimens of the Tobacco soils of that station, and two of the Sugar soils.

Captain Goodwyn, B. E. has at my request obliged me with another specimen of the Asphalte of Pymont, (see Proceedings of January) for our Mineralogical Collection, and I may mention here, that on the reverse of bricks from the ruins of Babylon, in our Museum, the bituminous cement of which is still adhering to them, I have found it to present as nearly as possible the same chemical characters!

Geological and Mineralogical Department.—At my solicitation, Mr. Howe, at Kyook Phyoo, has been good enough to send us an additional box of specimens from the Mud Volcano, the eruption from which is adverted to in my report of February. Mr. Howe states that —

“The Volcano is still in a bubbling boiling state, the orifice not larger than a tea cup, and there is a” hot slimy fluid to be dipped up at the surface, but no vapour or noise is emitted, and it is otherwise quiet.”

These specimens will I hope enable us to furnish a complete set of them to several Societies, to whom I doubt not they will be objects of much interest, as they will be enabled to compare them with the products of the Mud Volcanos of South America.

Captain Boys of the 6th Light Cavalry, Assistant to the Commissioner of Kemaon, who has already obliged us with a paper on the genus *Paussus*, and promised us a selection from his geological collections, being about to proceed on a trip towards some of the Thibet Passes, I have been able to be of some little assistance to him in the way of procuring books, instruments, &c., and by permission of the Secretary I have informed him, that the Society will be happy to repay any extra expenses he may incur in taking on men and *jobboos*, for the purpose of sending *back* to the nearest inhabited spots, as he proceeds on his journey, the specimens he may collect, requesting his attention particularly to the deposits of various organic remains at great heights, the formations in which these are found, and the glacial phenomena of which so many traces, and upon such a stupendous scale, must exist in those mountains and the lower ranges. By this arrangement we trust to obtain, with a very trifling expence, not only an assortment of specimens for our Museum, but some for exchange with our friends at home; * for in India the great defect in these matters is, that amongst our

* The Curator here read the following extract of a letter received that day by dawk from Captain Boyes, as follows:—

H. PIDDINGTON, Esq.

Atmorah, May 27, 1843.

Your last three notes have been duly received, and I now return you my best thanks for the kindness with which you have troubled yourself on my account. Your last note, respecting the sculls will meet with every attention I can give it, but I much fear that this proposed trip will not afford many specimens, as the natives either burn or consign them to the rapids. The route I have determined on is to go from this to Melum, across the Jowahir Pass, and if possible, return by Neetee. I have been induced to this in a great measure by your former letter, which seems to shew, that Captain Weller's Journal refers to some interesting points regarding the ammonite deposit, and I also wish more attentively to observe the country about Neetee and Mullairee. Last year when at the latter place, which is some 16 miles on this side the Pass, I obtained a few specimens of Fossil Shell, (either *Terebratulæ* or *Pecten*,) which I would wish more thoroughly to investigate, as I believe it is an opinion that no Fossils occur on this side the range. The mountain behind Melum, both on its Southern, S. E. and S. W. faces, is composed of Limestone, containing myriads of the above-mentioned Fossils, but the rock is so hard (even to giving fire with the steel) and the shells so closely wedged, that a stricter search and more time than I then had (I was only one day there) is necessary to produce a worthy result. The crags forming the ridge of the mountain (called Choping-ka-danda,) are formed of Clay Slate, which appears to have been upraised through the shelly deposit. The strata of the latter, as far as I could observe, are horizontal. I send by Dawk Bhangy the specimens I there collected, and hope that this trip will produce something more acceptable. Dr. Jameson informs me, that the specimens are all of them too small for practical purposes, which rather surprised me, as most of them are at least half a pound in weight; this fault I shall avoid in future, but having to carry them about myself, I could not well take larger specimens, which I shall now be enabled to do from the Society's assistance of the *jobboos* or coolies as may be. I should have been delighted to have gone to the Gung-tung Pass, but the distance from this precludes the possibility; there are however many interesting points in my present route, any one of which will amply repay the trouble incurred.”

few observers, with their unsettled residences and passing visits, together with the unfrequented localities of many of our remarkable Geological and Mineralogical specimens, we obtain perhaps *one* set of specimens, and it is a quarter of a century at least, before the spot is again visited by an European, who can select another set! As an instance; it is now 18 years since Captain Franklin visited the Diamond Mines of Punna in Bundelcund, and his specimens have even disappeared from our Museum. It may be 10 years more before another geologist visits the spot. A few sets of specimens from thence would be invaluable as presents at home.

The Rev. Mr. Pratt has obliged us again with a number of Geological specimens obtained at various parts on his recent voyage; many of which are valuable in themselves, or will fill up blanks in our Geological series.

I observed accidentally on passing the Kidderpore Bridge, a large lump of chalk amongst the ballast heaped by the side of the Nullah. Upon examination, this proved to be a piece of the upper chalk with flints! and as a specimen it fills up a blank in our collection. On another rock I found a number of oysters, (*Ostrea gregarea*,) which are also I think new to the Museum. It is of course impossible to ascertain the locality of these specimens, but they are always useful for reference.

I have to report in this department the dispatch of a box, containing a duplicate series (160 specimens) of Captain Pemberton's Geological Collection on his Mission into Bootan. Being a Government Collection, it may be right to place on record here, the letter addressed by me to our Secretary with the box.

H. TORRENS, Esq. *Secretary of the Asiatic Society.*

SIR,—In obedience to the desire expressed by the Honorable the Court of Directors, I beg to forward for transmission from the Geological Department of the Society, a duplicate set of Geological Specimens, 160 in number, collected on Captain Pemberton's Mission to Bootan.

2. These specimens it may be right to explain, though collected in 1837-38, were sent to the Museum in 1841, by Captain Pemberton's executor, General McLeod, B. E., and there recognised as being this series; but no catalogue or note accompanied them.

3. After much search for many months, it was discovered that the numbers referred to Capt. Pemberton's private Note Book, from which Mrs. Pemberton having copied the localities and other details, the Memorandum was sent out to the Society from England by General McLeod. Had we earlier possessed this note, no delay would have occurred in arranging and forwarding the collection.

4. A Catalogue accompanies, and a duplicate of it is enclosed in the box.

5. I beg to suggest, that a copy of this letter be forwarded with your letter of advice.

I have the honour to be, &c.

Asiatic Society's Rooms,
5th June, 1843.

H. PIDDINGTON,
Sub-Secretary of the Asiatic Society,
and Curator Museum Economic Geology of India.

The reference to the Gungtung Pass in the above is in relation to M. Jacquemont's well known mystery (or hoax) respecting some discovery to be made there. See Journal, Vol. V p. 190, which I had pointed out to Captain Boyes.—H. P.

