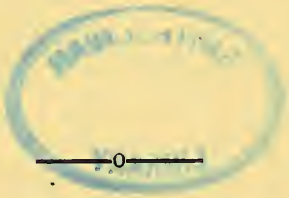
JOURNAL

OF THE

Royal Institution of Cornwall.

VOL. IV.



1871—1873.

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JOURNAL

OF THE

Royal Institution of Cornwall,

WITH THE

FIFTY-FOURTH ANNUAL REPORT.

No. XIII.
APRIL, 1872.

TRURO:
JAMES R. NETHERTON, 7, LEMON STREET.
1872.

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The Papers marked thus (*) are Illustrated.

THE

FIFTY-FOURTH ANNUAL REPORT

OF THE

ROYAL INSTITUTION

OF

CORNWALL.

INSTITUTED ON THE FIFTH OF FEBRUARY, 1818.

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1872.

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ROYAL INSTITUTION OF CORNWALL.

SPRING MEETING,

1871.

THIS Meeting was held on Tuesday, the 23rd of May, in the Library of the Institution. The Chair was occupied by the President, Mr. W. Jory Henwood, F.R.S., F.G.S., &c., who delivered the following Address :—

Our progress during the past year has been successful beyond example; we have not a single loss to deplore; and the numerous volunteers to our ranks prove the increase of general interest in our pursuits, whilst they ensure the usefulness of the INSTITUTION for years to come.

Since our last Spring-meeting the third part of Sir John Maclean's *Parochial and Family History of Trigg Minor* has appeared. It illustrates the Parish of Saint Breward *(Simonward)*; and even exceeds—if it be possible to exceed—in interest the first two parts, which are devoted to Blisland and Bodmin. Everything published by this Gentleman has a double claim on our attention; not only because he is a native of Cornwall; but that, for years past, the *Journal* of this *Institution* has been enriched by his labours.

It will be the agreeable duty of my successor to congratulate Dr. Bannister on the appearance of his *Glossary of Cornish Names*, which even now is about to issue from the press. We must all earnestly hope that its success will repay him for the time and research which we know he has bestowed on it.

The members of this INSTITUTION must ever feel a paternal

interest in the *Bibliotheca Cornubiensis*, which under the unflagging industry of Mr. G. C. Boase and Mr. W. P. Courtney is making satisfactory progress; some years, however, must elapse before we can rejoice with them on the completion of the most valuable work, for the faithful execution of which they prove themselves so thoroughly qualified.

Some thirty years ago the (LONDON) INSTITUTION OF CIVIL ENGINEERS offered premiums for Memoirs of Trevithick* and of Woolf;† but hitherto they have been unclaimed. It seems not yet to be generally known that before Woolf's mission to London he had been already employed by Trevithick in Cornwall. A biography of the great engineer—of whom a bust now stands before us—is, however, in preparation by his son, Mr. Francis Trevithick, of Penzance. I have been permitted to see many of the proof-sheets; but it would be unfair, both to the author and to my successor, if I were to forestal the important matter which is in store for us.

I feel myself the faithful interpreter of your sentiments in saying that Miss Fox could have offered this INSTITUTION no present more acceptable than the bust of the honoured and venerable father of Science in Cornwall, with which she has this day favoured us.

Mr. Burnard, by whom the busts of Mr. Fox and Mr. Trevithick were executed, himself presents the bust of Dr. Borlase which at length decorates our room.

It has been recently announced‡ that the Irish fern *Trichomanes radicans* was—as long ago as 1866—discovered by Mr. Fox, at Saint Knighton's Kieve, a spot we examined with so much pleasure last year.

Amongst other rare visitors during the late severe winter several wild swans—the survivors, probably, of a larger flight which had previously met an inhospitable reception on the moors near Roughtor—alighted in Marazion marsh about the beginning of January. One of them was soon killed, but two others—regardless alike of a well-frequented railway station within rifle-range, and of the visitors their presence attracted—remained with us for three months. On the approach of spring and the appearance of the water-lilies, however, they left us.

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* "Richard Trevithick was born [at Illogan] on the 13th of April 1771, * * * and died at Dartford, in Kent, on the 22nd of September 1832." EDMONDS, *Land's-end District*, pp. 257, 266.

† Arthur Woolf was baptized at Camborne 4th November 1766 (*Camborne Parish Register*), "died in Guernsey, 16th October 1837." Mr. JOHN HOCKING, C.E., MS. POLE, *Treatise on the Cornish Pumping Engine*, p. 53.

‡ Dymond, *Nature*, iv., p. 8.

The Pilchards cured at, and shipped from, the undermentioned ports during 1870,* were

Newquay 612½	4,372 hogsheads	on the north coast,	
Saint Ives 3,759½			
Mount's-Bay 1,289½	1,685½	,,	,, south ,,
East of the Lizard..... 396			
The Sean Fish were about 1,300	6,057½	,,	being the entire pro-
,, Drift ,, ,, .. 4,757½			duce of Cornwall;

the prices ranged from 64*s.* to 92*s.* 6*d.* per hogshead.

Some 400 hogsheads of herrings,—taken and cured in the same manner as pilchards, realized 52*s.* per hogshead.†

The Mackerel fishery is now in active progress; accounts to the present time, therefore, serve for comparison with corresponding periods in other years, but cannot comprehend returns of the entire fishing season. During the twelvemonth which ended on the 30th of April‡ 3,301 tons of the fish—approximately valued at Twenty Pounds per ton§—were taken by the West Cornwall Railway from Penzance and St. Ives. ||

The home consumption of pilchards, mackerel, and other fish I have been unable to ascertain.

The numbers of boats engaged and of persons employed, together with the estimated value of both nets and boats used in the fisheries on our coasts, are

Sean (Pilchard) *Fishery.*

	Seans.	Boats.	Persons.	Value of nets & boats.
North coast	314	451	692	£74,900
South ,, ...	65	168	818	21,960
Totals	379	619	1510	£96,860

---

* The Fishery of 1870 yielded

Summer fish (caught before the 15th Sept:		281½	hogsheads.
Autumn ,, (,, 1st Nov.)		3,346½	,,
Winter ,, (,, after ,,)		2,429½	,,
Summer fish realized about.....	64*s.* 0*d.*	per hogshead.	
Autumn ,, ,, ...	78*s.* 0*d.*	,,	
Winter ,, ,, from.....	82*s.* to 92*s.* 6*d.*	,,	

Bolitho, *Pilchard Circular*, 9th Feb: 1871. Fox, *Pilchard Circular*, 25th Feb: 1871.

† Fox, *Pilchard Circular*, 25th Feb., 1871.

‡ 983 tons of mackerel—for the most part, taken within comparatively short distances of Scilly, were taken from Penzance and Saint Ives by the West Cornwall Railway between the 1st and the 21st of May 1871.

§ This estimate has been obligingly procured for me by Mr. William Roberts of Chyandour.

|| For this—as well as for the immediately preceding—statement, I am indebted to Mr. J. D. Sheriff, C.E., Engineer of the Cornwall and West Cornwall Railway.

Drift Fishery.

	Boats.	Persons.	Value of nets.	Value of nets & boats.
North coast	192	632	£15,450	£42,900
South „	443	1,830	36,705	96,790
Totals	635	2,462	£52,155	£139,690

In the two fisheries, therefore, 1,254 boats are engaged;—
3,972 persons are employed;—
and a capital of £236,550 is invested in boats and nets.

The following columns show the numbers of seans and boats in use, the numbers of persons employed, and the amount invested, at different places, in the

Sean (Pilchard) *Fishery.*

Coasts.	Localities.	Seans.	Boats.	Persons.	Estimated Value.	Remarks.
North	Port Isaac	2	8	18	£1,000	
	Harlyn	1	4	18	415	
	Mother Ivy & Trehidy .	4	12	40	1,410	
	Newquay	9	45	162	5,000	
	Perran Porth	4	12	72	1,200	
	Saint Agnes	2	6	36	600	
	Saint Ives.....	285	329	260	62,700	
	Gurnard's-Head	2	10	24	800	
	Sennen	5	25	62	1,775	1 of the Sean-boats is propelled by a steam-engine.
South	Penberth	2	12	24	800	
	Mount's-Bay.....	23	46	169	5,750	
	Lizard	1	4	19	500	
	Cadgwith	4	12	76	2,000	
	Coverack	3	9	51	1,500	
	Porthalla	2	4	32	1,000	
	Saint Mawes.....	9	30	152	4,500	
	Gerrans	2	6	22	800	
	Portloe	3	9	54	810	
	Gorran Haven.....	2	6	34	540	
	Mevagissey	7	21	119	2,800	
		3	3	30	360	of small size.
	Charlestown.....	1	—	—	—	not afloat in 1870
	Polkerris	1	—	—	—	,,
	Looe	1	3	18	300	
	Port Wrinkle	1	3	18	300	
	Totals.....	379	619	1,510	£96,860	

The numbers of boats engaged and of persons employed, as well as the estimated value of the boats, nets and other appliances used, on various parts of our coasts, in the

Drift Fishery

are set forth in the following columns;—

Coasts.	Localities.	BOATS.		Persons.	Estimated Value.	
		First Class.	Smaller.		Of Nets.	Total.
North	Port Isaac	—	6	30	£450	£1,850
	Saint Ives	86	100	602	15,000	41,050
South	Mousehole	55	40	385	9,600	24,200
	Newlyn	90	40	730	15,350	36,100
	Porthleven	30	74	300	6,220	16,660
	Falmouth	—	6	24	270	750
	Gerrans	—	4	16	160	500
	Portloe	—	9	22	185	680
	Gorran Haven	—	8	40	480	1,520
	Mevagissey	—	61	205	2,960	11,500
	Polkerris	—	2	10	80	240
	Fowey	—	2	10	80	240
	Looe	—	22	88	1,320	4,400
	Totals	261	374	2,462	£52,155	£139,690

The foregoing eleborate details have been kindly supplied me by Mr. William Roberts of Chyandour. Both he and I have, however, received much valuable assistance from Messrs. Fox, Mr. William Roberts of Mevagissey, Mr. Hichens of Saint Agnes, Captain Haine of Saint Ives, Captains Hicks and Thomas of Newquay, Mr. Martin Wright of Mousehole, Mr. George Downing of Newlyn, Mr. R. S. James of Porthleven, and from several other persons.

Mr. Higgs, of Penzance, has courteously favoured me with the undermentioned particulars of the fisheries at Saint Ives, the Gurnard's Head, Sennen, and in the Mount's Bay;—

At *Saint Ives.*

330 Seans, with their equipments, estimated at		£74,360	
100 Large boats	,, ,,	50,000	
100 Small ,,	,, ,,	7,000	
			£131,260

Brought forward		£131,360
At the Gurnard's-Head and Sennen and in the Mount's-Bay.		
Seans, with their equipments estimated at	£55,000	
165 boats, ,, ,,	82,500	
100 ,, extra ,,	7,000	
		144,500
		£275,860
Cellars, stores, &c. at Saint Ives	£75,000	
,, ,, at Gurnard's-Head and Sennen, and in the Mount's-Bay	85,000	
		160,000
		£435,860

In 1827,

The Seans numbered 316, and they with their equipments, were valued at		£209,840
Drift-boats numbered 368, and they with their equipments, were valued at		61,400
		£271,240
The cost of cellars and other establishments on shore were valued at		£169,975
The men employed at sea on seans numbered	2,672	
,, ,, ,, drift-boats	1,599	
	4,271	
Persons to whom the fishery afforded employment on shore numbered	6,350	
	10,621	

Couch, *Reports of the Royal Cornwall Polytechnic Society*, iii., (1835), p. 82.

In 1832 the following estimate was made;—

Total number of Seans in Cornwall	269	about 250	effective;
,, Drift-boats ,,	231	,, 220	,,
,, ,, at Newlyn	100		
,, ,, ,, Mousehole & Porthleven	60		
,, ,, ,, Falmouth	6		
,, ,, ,, Mevagissey &c.	40		
,, ,, ,, Saint Ives	25		
	231		
,, of persons employed in the Sean-fishery			2,320
,, ,, ,, Drift ,,			1,350
,, ,, ,, in landing and curing the fish, repairing boats, nets, &c., about			5,000
Cost of 250 effective Seans	£175,000		
,, 220 drift-boats	44,000		
	£219,000		
,, cellars, cooperages, salt, &c.	60,000		

Courtney, *Ibid*, vi., (1838), pp. 121-122.

On the 31st December, 1869, a Return to an order of Parliament, showed that the undermentioned numbers of boats were then registered for use in the several ports of Cornwall;—

PORTS.	BOATS.						PERSONS Employed in Boats of the			TOTALS.		
	NUMBERS.			TONNAGE.								
	First Class.	Second Class.	Third Class.	First Class.	Second Class.	Third Class.	First Class.	Second Class.	Third Class.	Boats.	Tonnage.	Persons.
Padstow	—	76	45	—	134	203	—	204	185	121	337	389
Hayle (St. Ives)	32	112	65	517	989	123	195	566	263	209	1,629	1,024
Penzance	22	477	51	412	2,183*a*	37*a*	153	2,131	241	550	2,632	2,525
Falmouth & Truro ..	17	402	322	377	1,251	359	63	1,007	584	741	1,987	1,654
Fowey	17	352	172	263	1,443	306	86	1,179	460	541	2,012	1,725
Cornwall	88	1,419	655	1,569	6,000	1,028	497	5,087	1,733	2,162	8,597	7,317
United Kingdom....	4,856	27,001	11,103	125,609	101,916	14,654	30,204	100,891	35,653	42,960	242,179	166,748

a These tonnages were obligingly computed for me by Mr. Martin Mathews, of the Dock, Penzance.

3,633 tons of Brocoli, and 2,591 of Potatoes were sent by railway from West Cornwall during the year which ended on the 30th ult.*

In the fertile parish of Gulval and its immediate neighbourhood there are now under culture—

about twelve acres of onions,†
eight or ten „ asparagus,—
four „ pease,—
three or four „ carrots,—
twelve „ strawberries,—
seven „ raspberries,—
twenty-five „ gooseberries;

besides black currants, which thrive under the apple trees.‡

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* For these particulars,—as well as for information that from the 1st to the 21st of May 221 tons of new potatoes were despatched in like manner,—I have to thank Mr. J. D. Sheriff C.E.; Engineer of the Cornwall and West Cornwall Railways.

† "From the neighbourhood of Roscoff two million lbs. (893 tons) of onions are said to be sent to England only." Palliser, *Brittany and its By-ways*, p. 111.

‡ For these interesting details I am indebted to the Reverend W. Wriothesley Wingfield, M.A.; Vicar of Gulval, and Chairman of the Guardians in the Penzance Union.

"Mr. Thomas of Gulval estimates the extent and value of the Market-garden produce near Penzance as follows:

Crop.	Acres under cultivation.	Wages Paid.		Value of Crop.	
		Per acre.	Total.	Per Acre.	Total.
Brocoli	500	£4	£2,000	£20	£10,000
Potatoes.....	500	9	4,500	50	25,000
Onions.....	80	10	800	40	3,200
Asparagus	7	10	70	60	420
Gooseberries	50	8	400	30	1,500
Raspberries.....	10	8	80	40	400
Black currants ..	25	8	200	35	875
			£8,050		£41,395

Bolitho (W:) *Address to the Western Cottagers Gardening Society* (Cornish Telegraph) 31st August, 1870.

Ice is now largely manufactured in the neighbourhood; principally for use in packing the mackerel sent to distant markets; but it has been suggested that the ground in which brocoli are planted, during summer, may be more cheaply and effectually moistened by the gradual thawing of slightly-covered bits of ice, than by watering the surface. The practice, however, is by no means a general one.

During the present year Mr. John Arthur Phillips—whose researches as a scientific miner do honour to Cornwall—has submitted the slates of *Polgooth*, *Polmear*, *Dolcoath*, *Botallack*, Delabole, and other parts of the County to careful microscopic examination and chemical analysis;* a course of enquiry involving enormous toil, but which must some—I fear at a distant—day ensure practical results of enduring value.

Mr. Hunt's periodical accounts† of the produce of our quarries and mines, are so generally known and so justly appreciated that they call for no remark from me.

As my labours amongst our metalliferous deposits have recommended me to your notice, I feel it a duty to offer some account of our acquaintance with them.

The metalliferous series of Cornwall comprehends—granite,—slate, possibly of more than one period, associated, in some places, with hornblendic rocks,—and *elvan* which occasionally appears in *seemingly* isolated‡ masses, but usually forms broad *(courses)* dykes intersecting both granite and slate.

The granite occurs in four principal—beside in several smaller—bodies;§ slight differences of composition are not uncommon; but—excepting in particular districts—felspar, quartz, and mica are the principal ingredients; everywhere, however, schorl is more or less abundant. In some localities, at least, the felspar and the mica are of two kinds;‖ and in certain parts of the County the mica is replaced by talc.¶ An ordinary granitic basis often includes large, coincidently-placed crystals of felspar;** and these contain, not uncommonly, both mica and schorl.†† Microscopic cavities,—sometimes empty, but more frequently containing either liquid or gaseous matter,—have been detected

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* *Lond: Edin: and Dublin Phil: Mag:* xli., pp 87-107.

† *Memoirs of the Geological Survey of Great Britain* (Mineral Statistics), 1870.

‡ Thomas, (R.) *Survey of the Mining District from Chasewater to Camborne*, pp. 17, 49. Webb and Geach, *History and Progress of Mining in the Caradon and Liskeard District*, pp. 33, 36.

§ Boase, *Cornwall Geol: Tran*: iv., p. 362. Henwood, *Ibid*, v., p. 143.

‖ Haughton, *Proceedings of the Royal Society*, xvii., pp. 209-211.

¶ Fitton, *Thomson's Annals of Philosophy*, iii., pp. 180-104. Boase, *Cornwall Geol: Trans:* iv., p. 236. Henwood, *Ibid*, v., pp. 17, 44, 115-119. "It is reported that [Mr. Cookworthy] . . . not far from 1755, . . . first discovered [China-stone] in Saint Columb Church, or rather in the Tower, which is built of stone from Saint Stephens." Prideaux, *Relics of William Cookworthy*, p. 4.

** Henwood, *Cornwall Geol: Trans:* v., pp. 17, 145; viii., p. 682.

†† De la Beche, *Report*, p. 190. Henwood, *Cornwall Geol: Trans:* v. p. 145. Sorby, *Quarterly Journal of the Geological Society*, xiv., p. 475.

in all three principal ingredients of Cornish granite.* The granite of Cornwall is, for the most part, coarse-grained, but in this respect it differs considerably in different places; for example, that of the Saint Just and Saint Ives districts has a much coarser texture than any other, whilst at Tregoning and Godolphin it is usually finer. Moreover the coarse-grained rock is often traversed by veins of a like substance but of finer texture. Sometimes also isolated spheroids of schorl rock are embedded in it. Two series of joints, which intersect nearly at right-angles, divide the granite into rude quadrangles; others, of intermediate directions, subdivide it into triangles; and a *bedding*—approximating, in various places, to the contour of the surface†—often gives the rock a somewhat gneissose character.

The slate, in a general way, rests on the granite at an angle of perhaps 20°–45°;‡ but in some cases the junction is nearly vertical;§ and in other the rocks interlie near their boundaries.‖ Not uncommonly, however, just on the line of junction, the granite becomes extremely fine-grained; the slate, on the other hand is massive, and can be distinguished from the granite, merely by its darker colour. Veins of granite frequently penetrate the slate,¶ and masses of either rock are sometimes embedded in the other.** One district, indeed,—a distant one from any yet known body of granite,—affords numerous rude granitic spheroids completely isolated in the slate.†† It is by no means easy to describe the mineralogical composition of the slates, as the proportions of their various ingredients are seldom constant over any considerable tract. It may, perhaps, be stated that felspar, chlorite, mica, schorl

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* Sorby, *Quarterly Journal of the Geological Society*, xiv., pp. 488, 500; *Figs.* 111, 112, 113, 114, 115, 117, 118, 119, 120.

† Mac Culloch, *Geol: Trans:* ii., p. 71. Boase, *Cornwall Geol: Trans:* iv., p 366. Enys, *London and Edinburgh Phil: Mag:* ii., p. 322. Whitley, *Reports of the Royal Institution of Cornwall*, xxxii., p. 31. Henwood, *Cornwall Geol: Trans:* v., p. 171; viii., p. 672.

‡ Thomas, (R.), *Survey of the Mining District from Chasewater to Camborne*, p. 10. Henwood, *Cornwall Geol: Trans:* v., p. 151. Thomas, (C.), *Remarks on the Geology of Cornwall and Devon*, p. 19.

§ Henwood, *Cornwall Geol: Trans:* v., p. 151.

‖ De Luc, *Geological Travels*, iii., p. 293. Phillips, (W.), *Geol: Trans:* O.S., ii., p. 153, *Pl.* vii., Fig. 8. Thomas, (R.), *Survey*, p 10. Henwood, *Cornwall Geol: Trans:* v., p. 148; viii., p. 658. Webb and Geach, *History and Progress of Mining, &c.*, p. 67.

¶ Davy, *Cornwall Geol: Trans:* i., p. 20. Forbes, *Ibid* ii., p. 258. Carne, *Ibid* ii., p. 326. Edmonds, *Ibid* iii., p. 332. Boase, *Ibid* iv., p. 391. Henwood, *Ibid* v., pp. 150-151.

** Forbes, *Ibid* ii., pp. 254, 256.

†† Henwood, v., pp. 36, 72, 157. Salmon, *Quarterly Journal of the Geological Society of London*, xvii., pp. 517-522.

and hornblende are their principal constituents.* Near the granite they are mostly of green, brown, purple or violet hue; but at greater distances from it they are frequently of grey, blueish-grey, deep blue, brownish-yellow or buff colour; and some of these, in distant parts of Cornwall, enclose organic remains.† Certain slates are crystalline and cleave imperfectly, others show a thick-lamellar structure, many are highly fissile, and all are, more or less, interlaminated and veined with quartz. Intercalated bodies of hornblendic and felspathic rocks occur as broad bands of considerable range‡ in some, but at isolated masses in other§ places. The planes of cleavage almost always dip from the granite, the various layers of slate thus mantle round the slopes of the granitic hills;|| but their laminæ seldom dip so rapidly as the

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* Careful analysis of *killas* from various Cornish mines afforded the following results;—

MINES.	Silica.	Alumina.	Iron in various states.	Lime.	Soda.	Water.
Polgooth	50·8 to 63·2	19·8 to 21·	6·3 to 18·5	1·2 to 1·8	1·5 to 4·2	3·2 to 4·1
Polmear	49·2 to 49·3	18·	22· to 22·1	2·1	0·7	6·5 to 6·6
Dolcoath	67·3	20·7 to 20·9	4·3 to 4·6	1·9 to 2·1	3·3 to 3·4	1·1
Botallack	32·9 to 40·2	16·7 to 24·	15·3 to 20·8	4· to 5·	0·6 to 3·6	3·1 to 11·1

Potassa and titanic acid occurred in every case, but always in minute proportions; magnesia also was ever present, but generally in small quantities; except at *Botallack* where it amounted to from 6·4 to 11·6 per cent.

Phosphoric acid was detected at *Polgooth* and *Botallack;* but the oxide of manganese and manganoso—manganic oxide were discovered nowhere but at *Polgooth*, and sulphur was found at *Botallack* only.

Phillips, (John Arthur), *Lond. Edin. and Dublin Phil: Mag:* Fourth Series, xli., pp. 87-95.

† De la Beche, *Report on the Geology of Cornwall, Devon, and West Somerset*, pp. 82, 351. Henwood, *Cornwall Geol: Trans:* v., pp. 125, 158; viii., p. 700. Peach, *Ibid*, vii., p. 104.

‡ Pryce, *Mineralogia Cornubiensis*, p. 76. Rogers, *Cornwall Geol: Trans:* ii., pp. 218-220. Boase, *Ibid*, iv., pp. 208, 210, 306, 311. De la Beche, *Report*, pp. 79, 100. Henwood, *Cornwall Geol: Trans:* viii., p. 671.

§ Henwood, *Reports of the Royal Institution of Cornwall*, xxxiii., p. 39; *Cornwall Geol: Trans:* viii., p. 701. Giles, *Ibid*, vii., pp. 201, 205, 206.

|| Boase, *Cornwall Geol: Trans:* iv., p. 365. Henwood, *Ibid*, v., p. 144. Von Cotta, *Ore Deposits* (Translated by Prime), p. 403.

line of junction between the different rocks. Joints maintaining different directions intersect the several varieties of slate; but whether they meet at similar angles to the joints which traverse the granite,* is, perhaps, matter for further inquiry.

Elvan is, for the most part, disposed in veins or *(courses)* dykes, which sometimes measure a few feet only, but are commonly several fathoms, in width; occasionally also—though much less frequently—it occurs in isolated *(bunches)* masses.† *Elvan-courses* traverse granite as well as slate without interruption; and, in one, well-known, instance, two *lodes*, at least, are intersected by an *elvan*.‡ *Elvan-courses* frequently conform, both in direction and in dip to one series of joints in the rocks they penetrate;§ but they rarely interlie the cleavage-planes of the slate.§ Off-shoots from them now and then—but less frequently than *branches* from the *lodes*—extend into the adjoining strata.‖ Whilst in the slate they generally consist of compact felspar and quartz, mixed at times with schorl and—perhaps less frequently—with mica; enclose buff, pink or dove-coloured crystals of felspar and double-pointed crystals of quartz which sometimes seem to have suffered attrition. During their course through the granite, felspar and quartz still prevail, mica and schorl abound, and imbedded crystals are still numerous, but the basis is mostly of finer grain than in the slate. In both rocks, however, the *elvan* is usually coarser and more porphyritic towards the middle than at the sides. Near the surface—especially in the slate series—concentric envelopes of ferruginous matter occasionally enwrap masses of rock which differ in no respect from the ordinary *elvan* which surrounds them.¶ Joints without number traverse the *elvans* in all directions, dividing them into small blocks of irregular shapes.** In some varieties these joints are faced with schorl; in other, with

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* Boase, *Cornwall Geol: Trans:* iv., pp. 428-429. De la Beche, *Report*, pp. 272-274. Henwood, *Cornwall Geol: Trans:* v., pp. 168-174, *Table* 99; viii., pp. 673-674.

† Borlase, *Natural History*, p. 92. Pryce, *Mineral: Cornub:* p. 95. Thomas, (R.), *Report*, pp. 17, 49. Carne, *Cornwall Geol: Trans:* ii., p. 80. Henwood, *Edin: New Phil: Journal*, xxii., p. 166; *Cornwall Geol: Trans:* v., p. 166; viii., p. 660; *Pick and Gad*, p. 52-54. *Ante*, p. 9.

‡ Hawkins. *Cornwall Geol: Trans:* i., p. 151; *Pl.* v. Henwood, *Ibid*, v., p. 128; *Table* lxxxv.

§ Henwood, *Ibid* v , p. 165. Holl, *Quarterly Journal of the Geological Society*, xxiv., p. 415.

‖ Henwood, *Cornwall Geol*: *Trans*: v., p. 166.

¶ De la Beche, *Report*, pp. 173-192. Henwood, *Cornwall Geol: Trans:* v., pp. 160-168.

** Borlase, *Natural History*, p 92. Thomas, (R.), *Report*, p. 17. Boase, *Cornwall Geol: Trans:* iv., p. 401. Henwood, *Ibid* v., p. 164; viii., p. 652.

ferruginous matter; and not uncommonly with felspathic clay. Quartzose portions of the *elvans* contain microscopic cavities generally similar to—but in some respects different from—those found in quartz where it is an ingredient of the granite; yet, like them, empty in some, but containing either liquid or gaseous matter in other places.* Throughout the Mining districts the *elvans* usually bear a few degrees N. of E.—S. of W.;† but in other parts of Cornwall they sometimes take a nearly meridianal ‡ direction. Their dips—averaging, perhaps, from 40° to 60°—are less than those of the *lodes* which intersect them,§ but greater than the dips of the cleavage planes of the slates they intersect.

The serpentine is traversed by veins which, at intervals, contain native copper;|| but scarcely in sufficient quantity to give the rock a place in the metalliferous series.

Tin-ore occurs in granules disseminated through, and in short, thin, veins intersecting, as well the granite¶ as the *elvan*;** and

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* Sorby, *Quarterly Journal of the Geological Society*, xiv., pp. 485-488, *Fig.* 104-111.

† Carne. *Cornwall Geol: Trans:* i., p. 99; ii., p. 79. Thomas, (R.), *Report*, p. 17. Fox, *Reports of the Royal Cornwall Polytechnic Society*, iv., (1836), p. 83. De la Beche, *Report*, pp. 174, 178, 180, 182. Henwood, *Cornwall Geol: Trans:* v., p. 160; viii., pp. 660-661.

‡ Pryce, *Mineral: Cornub:* pp. 74, 75. De la Beche, *Report*, p. 179.

§ Carne, *Cornwall Geol: Trans:* i., p. 99; ii., p. 80. Henwood, *Ibid*, v., p. 160, 161.

|| Rashleigh, *British Minerals*, i., p. 31, *Pl.* xvii., Figs. 3, 8. Majendie, *Cornwall Geol: Trans:* i., p. 33. De la Beche, *Report*, p. 98. Greg and Lettsom, *Manual of Mineralogy*, p. 304. Garby, *Cornwall Geol: Trans:* vii., p. 88.

¶ Borlase, *Natural History*, p. 160. Pryce, *Mineral: Cornub:* p. 81. Jars, *Voyages Métallurgiques*, iii., p. 190. De Luc, *Geological Travels*, iii., p. 343. Berger, *Geol. Trans.*, O.S., i., p. 120. Sedgwick, *Trans: Cambridge Phil: Soc:* i., pp. 104-105; *Geol: Trans:* iii., p. 483; Address to the Geological Society, *Phil: Mag: and Annals*, ix., p. 284. Carne, *Cornwall Geol*: *Trans*: ii., p. 92. Von Oeynhausen and Von Dechen, *Phil: Mag: and Annals*, v., pp. 241-242. Boase, *Cornwall Geol: Trans:* iv., pp. 239-240. Hawkins, *Ibid*, p. 476. Davey, *Ibid*, pp. 484-485. De la Beche, *Report*, pp. 190, 346, 347. Henwood, *Cornwall Geol*: *Trans*: v., pp. 15, 20, 53, 94, 119, 122, 132, 146; viii., pp. 664-666.

Similar deposits of tin-ore in the granite of other countries have been described by—Jars, *Voyages Métallurgiques*, iii. Hawkins, *Cornwall Geol*: *Trans*: ii., pp. 39, 40. Manès, *Annales des Mines*, viii., (1823), pp. 513, 515, 520; ix., pp. 283-287, 463-466. Tremenheere, (G. B.), *Cornwall Geol*: *Trans*: vi., pp. 73, 74. Van Diest, *Banca*, (Translated by Foster), pp. 53, 62. Von Cotta, *Ore-deposits* (Translated by Prime), pp. 106, 123-124, 382.

Gold-like tin-ore is disseminated through the granite of various countries. Herbert, *Asiatic Researches*, i., p. 236. Murchison, De Verneuil, and Von Keyserling, *Geology of Russia*, i., p. 483. Clarke, *Quarterly Journal of the Geological Society*, xi., p. 403. Selwyn, *Ibid*, xiv., p. 536. Henwood, *Cornwall Geol*: *Trans*: viii., p. 175.

** Borlase, *Natural History*, p. 91. Rashleigh, *British Minerals*, ii.,

less mixed with the rock but aggregated on similar lines, and thus forming veinules equally minute in the slate.*

Copper and several of its ores impregnate the granite,† *elvan*,‡ and slate§ in much the same manner as tin-ore impregnates them, but less frequently.

Neither the particles which are scattered through the rocks nor the minute veins which intersect them are, however, of much —if, indeed, they are of any—economic importance.

In Cornwall the principal repositories of metals and ores are the *lodes*,‖ which consist in great measure of quartz; but—extending, without let or interruption, through every rock of the metalliferous series, and partaking the mineral character of each in its turn—always contain more or less felspar also. Notwithstanding the works in adjoining mines¶ often extend for considerable distances on *lodes* in corresponding directions, it is by no means certain that any one individual *lode* has been traced for more than about a mile in length. In fact, every *lode* throws off (so to speak) into the adjoining rocks *branches* and *strings* in such abundance that instead of a single *champion-lode*,** it and its congeners form rather a complex and irregular net-work of veins. Often, too, the *lode* first discovered dwindles to a mere line, whilst some of its off-shoots enlarge, and equal, or even exceed, both in size and richness, the vein from which they have separated. It is, perhaps rather more common for *lodes* to split as they are followed eastward, than the contrary. It is by no means unusual for them to divide immediately at their intersection by a *cross-vein*; on one side of which they *appear* united, but on the other in several *branches*. The *lodes* and *branches* which thus traverse the rock,—although they are not accurately parallel,—may, on a

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p. 5., *Pl.* ii., *Figs.* 1, 2. Hawkins, *Cornwall Geol*: *Trans*: i., p. 140. Carne, *Ibid*, ii., p. 79. De la Beche, *Report*, p. 175. Henwood, *Cornwall Geol. Trans.*, v., pp. 31, 37, 38, 85, 164-165.

* Rashleigh, *British Minerals*, ii., p. 6, *Pl.* ii , Fig. 5. Carne, *Cornwall Geol*: *Trans*: ii., p. 84. Boase, *Ibid*, iv., pp. 251-253, 440. De la Beche, *Report*, pp. 316, 317. Henwood, *Cornwall Geol*: *Trans*: v., pp. 101, 135, 238-240; *Pl.* xi., Figs. 1, 2, 3.

† Henwood, *Cornwall Geol*: *Trans*: v., p. 73.

‡ De la Beche, *Report*, p. 182.

§ Henwood, *Cornwall Geol*: *Trans*: v., pp. 73, 98, 239.

‖ Borlase, *Natural History*, pp. 142, 147. Pryce, *Mineral*: *Cornub*: pp. 77-95. Phillips, (W.), *Geol*: *Trans:* ii., pp. 126-133. Carne, *Cornwall Geol*: *Trans*: ii., p. 51. Boase, *Ibid*, iv., pp. 439-442. De la Beche, *Report*, p. 318. Henwood, *Cornwall Geol*: *Trans*: v., pp. 174-175; viii., pp. 675, 705-706. Von Cotta, *Ore-Deposits*, pp. 26, 412.

¶ Henwood, *Cornwall Geol*: *Trans*: v., p. 175.

** The larger *lodes* are provincially called *Champion-lodes*.

large scale, and as a general fact be regarded to coincide in direction; but they dip at diverse angles, and sometimes different ways, and thus often intersect. Such intersections are neither peculiar to one rock, nor to veins affording merely one kind of ore; for some occur in granite, other in slate, several yield tin-ore only, many afford copper-ore alone, and a few contain both. The results of these interferences are as various as the conditions under which they occur; sometimes they unite and continue together for considerable distances, but at length separate; not uncommonly one is displaced *(heaved)* horizontally or *(thrown)* vertically by another; and now and then both seem disordered, and to have lost their distinctive characters near the point of their intersection. As a general fact the *lodes* which contain a mixture of tin and copper ores are wider than those which afford either ore alone. Moreover *lodes* maintain a greater average width in slate than in granite, and within one hundred fathoms of the surface than at greater depths.* On passing from one rock to another, and from riches to poverty, the widths of *lodes* frequently change;† under ordinary circumstances, however, each individual *lode* commonly maintains a characteristic breadth.‡ The directions of the *lodes*,§ in different mining districts, are neither perfectly identical, nor—owing to slightly unconformable flexures in confronting parts of neighbouring *lodes*—are those of even the same district strictly parallel. Indeed, central parts of the county, are traversed by—so to speak, two systems—the *Champion-lodes* and the *Caunter-lodes*, each of which maintains its own normal

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* Lodes which yield the ores of tin and copper average 4·7 feet in width;

,,	,,	tin-ore	,,	3·0	,, ,,
,,	,,	copper-ore	,,	2·9	,, ,,
,,	in granite		,,	3·1	,, ,,
,,	in slate		,,	3·7	,, ,,
,,	at less than 100 fathoms deep		,,	3·9	,, ,,
,,	at more	,, ,,	,,	3·3	,, ,,

Henwood, *Cornwall Geol. Trans.*, v., pp. 243-244, Table ci.

† Borlase, *Natural History*, p. 152. Pryce, *Mineral: Cornub*: p. 79. Phillips, (W.), *Geol: Trans*: ii., p. 116. Thomas, (R.), *Report*, p. 19. Carne, *Cornwall Geol: Trans*: ii., pp. 88, 95, 105. Boase, *Ibid*, iv., p. 444; *Primary Geology*, p. 171. Taylor, *Reports Brit Ass*: (1833), p. 4. Burr, *Mining Review*, ii., p. 217. Fox, *Reports of the Royal Corn: Pol: Society*, iv., p. 84. Phillips, (Prof.), *Geology*, (Lardner's Cyclopædia), p. 129. De la Beche, *Report*, p. 343. Henwood, *Cornwall Geol: Trans*: v., pp. 241-243; viii., p. 677.

‡ *Ibid*, v., p. 241.

§ Borlase, *Natural History*, p. 145. Pryce, *Mineral: Cornub*: p. 80. Phillips, (W.), *Geol: Trans:* ii., p. 113. Thomas, (R.), *Report*, p. 19. Carne, *Cornwall Geol: Trans*: ii., p. 85. Fox, *Reports of the Royal Cornwall Polytechnic Society*, iv., p. 83. De la Beche, *Report*, pp. 302-309. Buckland,

range ;* and in the westernmost region the *lodes* show a certain degree of divergence.† But notwithstanding there is scarcely a point of the compass towards which some *lode* or other does not trend ;‡ and that—whilst the *lodes* in many tracts have, amongst themselves, an approximate coincidence—their mean directions in the several districts are materially different ;§ the average bearing throughout the County is about 5° N. of E.—S. of W.,§ a range not materially different from that of the granite which appears at intervals between Dartmoor and the Land's-end ; and, perhaps, not altogether unlike the course of a line drawn through the centre of Cornwall.|| The *lodes*—presenting as many flexures in their downward as in their onward course¶—vary in dip from even less than 45° to 90°, and, perhaps, average about 70° from the horizon.** Instances of *lodes* dipping oppositely in different parts of their range—though not unknown—are infrequent.†† In

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Bridgewater Treatise, ii., p. 108. Burr, *Practical Geology*, p. 286. Henwood, *Cornwall Geol*: *Trans*: v., pp. 174, 250-254; viii., p. 674, 704. Hopkins, (E.), *Geology and Terrestrial Magnetism*, p. 47. Whitney, *Metallic Wealth of the United States*, p. 206. Thomas, (C.), *Geology of Cornwall and Devon*, p. 5 Moissenet, *Annales des Mines*, 6me Série, iii., pp. 161-171. Webb and Geach, *Caradon and Liskeard District*, p. 5. Von Cotta, *Ore Deposits*, p. 407.

* Carne, *Cornwall Geol*: *Trans*: ii., p. 85. Fox, *Reports of the Royal Cornwall Polytechnic Society*, iv., p. 83. Henwood, *Cornwall Geol*: *Trans*: v., p. 253.

† Henwood, *Cornwall Geol*: *Trans*: v., p. 251, *Table* ciii.

‡ *Ibid*, v., *Table* ciii.

§ The mean direction of the *lodes* in the different districts of Cornwall, is

Saint Just	35° S. of E.—N. of W.
Saint Ives	8° S. of E.—N. of W.
Marazion	1° N. of E.—S. of W.
Gwinear, &c	2° S. of E.—N. of W.
Helston	16° N. of E.—S. of W.
Camborne, &c	20° N. of E.—S. of W.
Redruth, &c	22° N. of E.—S. of W.
Saint Agnes	22° N. of E.—S. of W.
Saint Austell	13° N. of E.—S. of W.
Caradon	18° N. of E.—S of W.
Tavistock, &c	9° N. of E.—S. of W.

Ibid, v., p. 250 ; viii., p. 674.

|| Boase, *Ibid*, iv., p. 362. De la Beche, *Report*, p. 309. Henwood, *Cornwall Geol*: *Trans*: v., p. 251.

¶ Borlase, *Natural History*, p, 152. Pryce, *Mineral*: *Cornub*: p. 80. Phillips, (W.), *Geol: Trans*: ii., p. 115. Thomas, (R.), *Report*, p. 19. Carne, *Cornwall Geol*: *Trans*: ii., pp. 89, 92, 97, 106, 322. Fox, *Report of the Royal Cornwall Polytechnic Society*, iv., p. 85. Henwood, *Cornwall Geol*: *Trans*: v., pp. 245-249; viii., pp. 674, 704.

** *Ibid*, p. 247.

†† Thomas, (R.), *Report*, pp. 33, 44, 54. Carne, *Cornwall Geol*: *Trans*: ii., p. 97, 98. Henwood, *Ibid*, v., p. 247.

obedience, without question, to some law yet unrecognized—the veins—whether *lodes** or *cross-courses**—dip much more frequently *towards*, than *from* the granite; and—as well in the United States† as in this country‡—the veins which maintain a direction nearly meridianal,§ are, on the whole,—whatever their mineral character—more highly inclined than such as range transversely‖ to them. *Lodes* intersecting dissimilar rocks obliquely to the lines of their junctions, are sometimes slightly deflected,¶ and occasionally pass for short distances between them;** but they suffer no interruption, and soon resume their normal directions. Generally speaking the junctions of different rocks occupy corresponding positions in both sides *(walls)* of *lodes*;†† but this is not always the case; for the identical rocks which confront in the opposite *cheeks* of divers *lodes* during much of their horizontal and vertical range, occupy widely different positions,—whether they form the northern‡‡ or the southern,§§ the upper‖‖ (*hanging-wall*) or the lower¶¶ (*foot-wall*)—sides of the selfsame *lodes* in

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* Henwood, *Cornwall Geol*: *Trans*: v., pp. 246, 277, *Tables* cii., cv.; viii., pp. 675, 682. *Postea* p. 28.

† *Ibid*, viii., p. 408.

‡ Thomas, (R.), *Report*, pp. 19, 21. Fox, *Reports of the Royal Cornwall Polytechnic Society*, iv., p. 86 Henwood, *Cornwall Geol*: *Trans*: v., pp. 247, 277; viii., pp. 408, 675, 682, 704, 715.

§ *Ibid*, v., p. 277; viii., p. 408, 682, 704.

‖ *Ibid*, v., p. 247; viii., p. 408, 675, 715. *Postea* p. 28.

¶ Fox, *Reports of the Royal Cornwall Polytechnic Society*, iv., p. 85. Henwood, *Cornwall Geol*: *Trans*: v., p. 201.

** De Luc, *Geological Travels*, iii., p. 293. Phillips, (W.), *Geol*: *Trans*: ii., p. 155. Thomas, (R.), *Report*, p. 43. Carne, *Cornwall Geol*: *Trans*: ii., pp. 93, 104, 105, 318, 319. Hawkins, *Ibid*, ii., p. 378. Henwood, *Phil*: *Mag*: *and Annals*, x., p. 360; *Cornwall Geol*: *Trans*: v., pp. 192, 196-201; viii., pp. 657-660. De la Beche, *Report*, p. 332. Boase, *Primary Geology*, p. 176. Salmon, *Mining and Smelting Magazine*, i., p. 388. Webb and Geach, *Caradon and Liskeard District*, p. 67.

†† De Luc, *Geological Travels*, iii., p. 293. Carne, *Cornwall Geol*: *Trans*: ii., p. 72. Henwood, *Ibid*, v., p. 201. Thomas, (C.), *Geology of Cornwall and Devon*, p. 19, *Pl.* iii. Salmon, *Mining and Smelting Magazine*, i., p. 385-388, *Pl.* v.

‡‡ Thomas, (R.), *Report*, p. 45. Hawkins, *Cornwall Geol*: *Trans*: ii., p. 379. Henwood, *Phil*: *Mag*: *and Annals*, x., p. 362; *Cornwall Geol*: *Trans*: v., pp. 198, 200; viii., p. 657.

§§ *Ibid*, v., pp. 196, 197, 198, 200.

‖‖ *Ibid*, v., pp. 81, 196, 197, 198.

¶¶ Thomas, (R.), *Report*, p. 45. Hawkins, *Cornwall Geol*: *Trans*: ii., p. 379. Henwood, *Phil*: *Mag*: *and Annals*, x., p. 362; *Cornwall Geol*: *Trans*: v., pp. 198, 200; viii., pp. 657, 659, 660. Fox, *Reports of the Royal Cornwall Polytechnic Society*, iv., p. 93.

"The strata are highest on the *(ledger)* lower side of the vein, and lowest on the *(hanger)* upper side."

PHILLIPS, (JOHN), *Geology of Yorkshire*, ii., p. 111.

other parts of their course. Moreover, portions of similar rocks occupy different positions on the opposite boundaries of many *lodes;* whilst numerous beds and veins, of unlike character, appear in one side only but have no existence in the other.* Both in structure and composition the *lodes* are closely related to the rocks immediately adjoining them. Their structure, like that of the rocks, seems in some measure dependent on their mineral characters. Where their composition is most uniform they consist chiefly of quartz; and there—as in the homogeneous clay-slates—a jointed structure frequently prevails;† but in the more mixed and heterogeneous—which also form the largest portions of the *lodes*—this character is less common. The quartzose parts are often traversed by joints having the same directions as the *lodes* themselves; which are thus divided lengthwise into subordinate veins, plates, or *combs.*‡ These joints, however, do not long continue distinct and apart, for like joints in the rocks, they curve, unite, separate, and again fall together; thus dividing the substance of the *lodes* into irregular plates or slices, which generally thin-off above, below, and at the ends, whilst the thicker portions of some adapt themselves to the thinner portions of others. When the *lodes* coincide in direction with the joints of the rocks, they appear to be bounded by *smooth walls;* but when the joints disappear, and—as in many, if not in most, cases—there is a gradual transition between the *vein-stones* and the containing (*Country*) rocks, the *walls* are said to be *rough.* The *lodes* not only afford instances of a jointed structure parallel to their *strike,* but they are frequently traversed by cross-joints also;§ and examples of thick lamination, or horizontal *bedding* are not uncommon. Near the separation between the *lodes* and the *Country* the joints are frequently filled with (*flucan*) unctuous clay;‖ and this—like the (*Slickensides*) glossy surfaces of copper-pyrites, iron-pyrites, galena and other ores—is often scored with curved, crooked and unconformable striæ, which —within short distances—not only dip differently—often indeed

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* Boase, *Primary Geology*, pp. 174-178. Henwood, *Cornwall Geol: Trans*: v., pp. 50, 196, 197; viii., pp. 702-703, *Fig.* 32.

† Pryce, *Mineral*: *Cornub*: p. 95. Henwood, *Cornwall Geol*: *Trans*: v., p. 179.

‡ Boase, *Ibid*, iv., p. 448; *Primary Geology*, p. 179. Fox, *Reports of the Royal Cornwall Polytechnic Society*, iv., p. 90. De la Beche, *Report*, p. 339. Henwood, *Cornwall Geol*: *Trans*: v., pp. 179-182; viii., pp. 680-681. Von Cotta, *Ore-Deposits*, p. 416.

§ Pryce, *Mineral: Cornub:* p. 95. Carne, *Cornwall Geol: Trans:* ii., pp. 64, 120. Henwood, *Ibid*, v., p. 181. Fox, *Reports of the Royal Corn: Pol: Society*, iv., p. 93.

‖ Pryce, *Mineral: Cornub:* p. 93. Fox, *Reports of the Royal Corn: Pol: Society*, iv., p. 90. Henwood, *Cornwall Geol: Trans:* v., p. 181.

oppositely, but frequently interlace whilst intersecting the vein-stones.* Portions of many *lodes*—from enclosing bodies identical in character with the rocks immediately adjoining them—have a brecciated appearance. These are not uncommon in granite and *elvan;* but they are more conspicuous in the slate, and especially in the fossiliferous strata of East Cornwall. In some instances they form short vein-like bodies, in other they occur as angular masses; occasionally they are sharply defined, whilst, frequently, they seem connected by almost imperceptible transitions with the ingredients which surround them. Here and there they are enveloped in successive accretions of quartz, each distinguished by some peculiarity of structure or hue; and small cavities studded with minute botryoidal concretions of agatine structure sprinkled with various crystals occur at intervals between them. When they consist of slaty matter the planes of their cleavage often—though not always—coincide with those of the neighbouring rock; but where they are composed of granite or *elvan* their resemblance to the other vein-stones is so close that their relations cannot be so well ascertained.† Between these—of which many are of scarcely more than microscopic dimensions,—and the masses (*horses*) which—widening from mere lines to many feet or even fathoms, and frequently attaining great length and depth—may be said rather to split, than to be contained in, the *lodes*,‡ it is difficult, if not impossible to draw a distinction§; in all, however, the mineral characters are identical with those of the immediately contiguous rocks. Moreover, when such phenomena occur at the contact of different rocks,‖ the planes of their junctions in the enclosed (*horses*) exactly confront their counterparts in the (*Country*) sides (*walls*) of the *branches* of *lodes* by which they are enclosed. In almost every part of Cornwall certain *lodes* contain at intervals

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* Henwood, *Edin*: *New Phil*: *Journal*, xxii., p. 161; *Cornwall Geol: Trans:* v., pp. 53, 172, 181-182.

† Carne, *Phil: Trans:* xcvii., p. 294; *Cornwall Geol: Trans:* ii., pp. 61, 94. Phillips, (W.), *Geol: Trans:* ii., p. 128. Rule, *Cornwall Geol*: *Trans*: i., p. 225. Boase, *Ibid*, iv., pp. 283, 287, 291. Taylor, (J.), *Reports of the British Association*, iii., p. 20. Fox, *Reports of the Royal Corn: Pol: Society*, iv., p. 84. De la Beche, *Report*, pp. 322-325. Henwood, *Cornwall Geol: Trans*: v., pp. 210-212; viii., pp. 712-714. Salmon, *Quarterly Journal of the Geological Society*, xvii., p. 519.

‡ Pryce, *Mineral*: *Cornub:* p. 96. Phillips, (W.), *Geol*: *Trans*: ii., p. 128. Boase, *Cornwall Geol*: *Trans*: iv., p. 441; *Primary Geology*, p. 179. Fox, *Reports of the Royal Corn*: *Pol*: *Society*, iv., p. 108. Henwood, *Edin: New Phil: Journal*, xxii., p. 155; *Cornwall Geol: Trans*: v., pp. 176, 188; viii., p. 712. Von Cotta, *Ore-Deposits*, p. 412.

§ Henwood, *Cornwall Geol*: *Trans*: v., p. 211.

‖ Sedgwick, *Trans*: *Cambridge Phil*: *Society*, i., p. 122. Henwood, *Cornwall Geol: Trans*: v., p. 189.

rough spheroidal and globular masses of either granite,* slate,† *elvan*,‡ quartz,§ galena,‖ copper-pyrites,¶ or tin-ore,** which are frequently enveloped in successive accretions, either of the same,* † ‡ § ¶ or of different,†† substances. Moreover in masses of uniform composition, one extremity is sometimes of schistose structure, whilst the other is made up of successive hemispheroidal layers.‡‡ In many cases, however, no aggregation of successive, concentric, layers seems to have taken place since the spheroidal masses assumed their present forms.§§ Cavities (*vughs*), of larger or smaller dimensions, occur, in some part or other, of every *lode;* and beside these, the quartz of some veins contains microscopic cavities, which number "upwards of a" thousand millions in one cubic inch.‖‖ In their composition the *lodes* always partake the nature of the immediately contiguous rock;¶¶ and thus in the granite and *elvan* felspar prevails;¶¶ yet in both quartz is

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* Edmonds, *Cornwall Geol*: *Trans*: iii., p. 332. Carne, *Ibid*, iii., p. 238. Henwood, *Edin*: *New Phil*: *Journal*, xxii., p. 166; *Cornwall Geol*: *Trans*: v., pp. 40, 183. Salmon, *Quarterly Journal of the Geol*: *Society*, xvii., p. 518.

† Carne, *Phil*: *Trans*: xcvii., p. 293; *Cornwall Geol*: *Trans*: ii., p. 94. Henwood, *Edin*: *New Phil*: *Journal*, xxii., p. 166; *Cornwall Geol*: *Trans*: v., pp. 40, 183. De la Beche, *Report*, p. 322. Boase, *Primary Geology*, p. 115.

‡ Henwood, *Edin*: *New Phil*: *Journal*, xxii., p. 166; *Cornwall Geol*: *Trans*: v., pp. 38, 87, 183.

§ De la Beche, *Report*, p. 322. Henwood, *Cornwall Geol*: *Trans*: p. 183; *Table* vi.

‖ *Ibid*, viii., p. 703.

¶ *Ibid*, v., p. 183.

** Carne, *Ibid*, iv., p. 100. Henty, *Report of the Miners' Association*, 1867, p. 55.

†† Henwood, *Cornwall Geol*: *Trans*: v., p. 184.

‡‡ Carne, *Phil*: *Trans*: xcvii., p. 293; *Cornwall Geol*: *Trans*: ii., p. 94; iii., p. 100. Henwood, *Edin*: *New Phil*: *Journal*, xxii., p. 166; *Cornwall Geol*: *Trans*: v., p. 183. Salmon, *Quarterly Journal of the Geol: Society*, xvii., pp. 517-522. Henty, *Report of the Miners' Association*, 1867, p. 55.

§§ Sorby, *Quarterly Journal of the Geol*: *Society*, xiv,, p. 474.

‖‖ Carew, *Survey of Cornwall*, f. 10. Borlase, *Natural History*, p. 148. Carne, *Cornwall Geol*: *Trans*: iii., p. 80. Boase, *Ibid*, iv., p. 442. Fox, *Reports of the Royal Corn: Pol*: *Society*, iv., p. 85. De la Beche, *Report*, p. 318. Henwood, *Cornwall Geol: Trans*: v., p. 190. Von Cotta, *Ore-Deposits*, p. 412.

¶¶ Jars, *Voyages Métallurgiques*, iii., p. 194. Carne, *Cornwall Geol: Trans:* ii., p. 88. Henwood, *Ibid*, v., pp. 186, 226; viii., pp. 675-680. Von Cotta, *Ore-Deposits*, p. 212.

also abundant,* and in the slate it predominates.† Between the lodes and the rocks they traverse, however, a transition, or—so to speak—an assimilation often takes place so gradually that no absolute line of demarkation can be drawn. Large portions of the *lodes* which intersect the fossiliferous slates of East Cornwall, consist of very white‡ crystalline quartz abounding in drusy cavities lined with crystals. The superficial parts of many—perhaps of most—*lodes* abound in earthy iron-ore of pale-yellow, brick-red, or dark-brown hue, mixed with quartz of, more or less, granular character (*gossan*).§ And whatever may be the principal produce of the *lodes* elsewhere tin-ore is not uncommonly sprinkled through these ingredients.‖ When *tin-lodes* traverse the *granite* their most productive vein-stones are pale-greenish or brownish-red felspar, confusedly crystalline, but rarely in distinct crystals, mixed with quartz and schorl; sometimes, however, schorl and quartz are abundant ingredients; and now and then quartz prevails; the tin-ore generally occurs in crystalline granules, which seldom exceed the size of pease and are usually of almost microscopic smallness;¶ but, for short distances, minute strings of *cassiterite* and schorl occasionally intersect the other constituents.**

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* Berger, *Geol: Trans:* i., p. 176. Carne, *Cornwall Geol: Trans*: ii., pp. 87, 95. Boase, *Ibid*, iv., p. 441. Fox, *Reports of the Royal Corn*: *Pol*: *Society*, iv., p. 98. De la Beche, *Report*, p. 340, *Fig.* 62. Henwood, *Cornwall Geol: Trans*: v., pp. 185, 226, 229; viii., p. 675-680. Von Cotta, *Ore-Deposits*, p. 412.

† Carne, *Cornwall Geol*: *Trans*: ii., pp. 87, 95. Henwood, *Ibid*, v., pp. 184, 228, 229; viii., pp. 677, 706; *Edin: New Phil: Journal*, xxii., p. 156. De la Beche, *Report*, pp. 340-341, *Fig.* 63, 64.

‡ Microscopic cavities in the quartz of veins "are the chief cause of the very unusual whiteness of the mineral?" Sorby, *Quarterly Journal of the Geological Society*, xiv., p. 474.

§ Pryce, *Mineral*: *Cornub*: pp. 88-89. Phillips, (W.), *Geol: Trans:* ii., p. 117. Carne, *Cornwall Geol: Trans:* ii., pp. 95, 122. Fox, *Reports of the Royal Corn: Pol: Society*, iv., p. 95. De la Beche, *Report*, p. 326. Henwood, *Cornwall Geol: Trans:* v., pp. 204-208, 226-227; viii., p. 676-678, 707. Thomas, (C.), *Geology of Cornwall and Devon*, pp. 5, 19.

‖ Phillips, (W.), *Geol*: *Trans*: ii., p. 117. Thomas, (R.), *Report*, p. 20. Carne, *Cornwall Geol*: *Trans*: ii., p. 102. Fox, *Reports of the Royal Corn: Pol: Society*, iv., p. 85. De la Beche, *Report*, p. 326. Henwood, *Cornwall Geol*: *Trans:* v., pp. 205, 226; viii., p. 677. Von Cotta, *Ore-Deposits*, p. 413.

¶ Henwood, *Cornwall Geol*: *Trans*: v., p. 226.

** Jars, *Voyages Métallurgiques*, iii., p. 190. Sedgwick, *Trans*: *Cambridge Phil*: *Society*, i., p. 108; *Geol*: *Trans*: iii., p. 483; *Phil: Mag: and Annals*, ix., p. 284. Carne, *Cornwall Geol*: *Trans*: ii., pp. 84, 92. Von Oeynhausen and Von Dechen, *Phil: Mag: and Annals*, v., p. 241. De la Beche, *Report*, p. 346, *Fig.* 67. Boase, *Cornwall Geol: Trans*: iv., p. 238. Hawkins, *Ibid*, iv., p. 476. Henwood, *Ibid*, v., pp. 15, 119, 226.

Tin-lodes when in *slate* consist mostly of quartzose slate (*capel*),* chlorite, quartz and schorl in thin alternations, frequently mixed with quartz, and usually much contorted;† the tin-ore is interspersed amongst these substances even more minutely than where it is associated with granitic minerals; and is, almost invariably mixed with larger proportions of other ores.‡ The *lodes* which yield *copper-ore* in *granite* almost always contain *gossan* near the surface, and sometimes to considerable depths.§ The quartz they include is, perhaps, scarcely so (*sugary*) granular minutely divided as in the slate, but it opens in small irregular masses which crumble under a slight pressure. The numberless cavities which penetrate this slightly coherent ingredient often contain earthy brown iron-ore, felspathic clay, earthy black copper-ore and malachite, at greater depths fluor is not an uncommon vein-stone, earthy black copper-ore is frequently succeeded by vitreous copper, and this by copper-pyrites ‖ One of the principal districts was anciently wrought for the tin-ore it afforded near the surface; but downward the tin was gradually replaced by copper, of which, in fact, it proved to be one of the richest and most extensive repositories in Cornwall;¶ yet deeper, however, tin-ore re-appeared,** and for sometime it has been almost the only product†† of the neighbourhood. The *lodes* which yield *copper-ore* in *slate* contain—large quantities of soft, *drusy*, yellow or pale-brown, earthy iron-ore,—blende occasionally to some amount,—tin-ore frequently, though in small proportions,—and masses of galena at intervals; iron-pyrites is often abundant. Their earthy ingredients are mostly quartz (which in favourable situations is often friable), mixed sometimes with (*prian*) felspathic clay, less frequently with chlorite, and now and then with fluor. Near the surface these

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* Pryce, *Mineral*: *Cornub*: p. 90. Phillips, (W.), *Geol: Trans*: ii., p. 119. Carne, *Cornwall Geol*: *Trans*: ii., p. 87. Boase, *Ibid*, iv., p. 448. Henwood, *Edin*: *New Phil*: *Journal*, xxii., p. 156; *Cornwall Geol: Trans:* v., pp. 183, 220. Fox, *Reports of the Royal Corn*: *Pol: Society*, iv., p. 87.

† Conybeare, (J. J.), *Annals of Philosophy*, v., N.S., p. 189. Boase, *Cornwall Geol: Trans:* iv., pp. 244, 250. Henwood, *Ibid*, v., p. 228.

‡ *Ibid*, v., p. 228.

§ *Ibid*, v., p. 227.

‖ Pryce, *Mineral: Cornub:* pp. 88, 91. Phillips, (W.), *Geol: Trans:* i., p. 25; ii., pp. 117, 119 Carne, *Cornwall Geol: Trans:* ii., p. 95. Fox, *Reports of the Royal Corn: Pol: Society*, iv., pp. 95, 96. De la Beche, *Report*, p. 326. Henwood, *Cornwall Geol*: *Trans:* v., pp. 206, 207, 227; viii., pp. 678-680.

¶ *Cornwall Geol: Trans*: i., pp. 252, 256, 259; ii., pp. 428, 430, 432, 434, 436; iii., pp. 342, 344, 346, 348, 351.

** Carne, *Ibid*, ii., p. 102. Henwood, *Ibid*, v., *Table* li.

†† Thomas, (J.) and Henwood, *Journal of the Royal Institution of Cornwall*, iii., pp. 191-197. Hunt, *Mineral Statistics*, 1867, p. 5; 1868, p. 5.

are generally sprinkled with iron-pyrites, earthy black copper-ore and malachite, which are succeeded by vitreous copper, and at length all are replaced by copper-pyrites.* But notwithstanding the ores of tin and of copper usually affect different *lodes*, and indeed different rocks,† they are intimately mixed‡ in some of the largest and most productive mines. The ores of lead § mostly occur at some distance from the granite; and are limited to groups of *lodes* traversing schistose rocks, which are sometimes fossiliferous.‖ Notwithstanding the rarity of symmetrical arrangement in the constituents of *lodes*, one ingredient (the *leader*), or an admixture of ingredients, sometimes maintains a certain continuity for considerable lengths and depths; but at least as frequently the various components are irregularly mingled. It has been already stated that compact portions of the *lodes* are chiefly siliceous; and that sometimes they may be entirely of quartz; yet now and then the whole substance is metallic. The alteration from poverty to riches, however, is seldom a sudden one; for on the outskirts of rich bodies of ore, granules, small masses, and short thin *branches* impregnate the vein-stone.¶ The

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* Pryce, *Mineral: Cornub:* pp. 88, 91. Phillips, (W.), *Geol: Trans:* ii., pp. 117, 119. Carne, *Cornwall Geol: Trans:* ii., p. 95. Fox, *Reports of the Royal Corn: Pol: Society*, iv., p. 97. De la Beche, *Report*, pp. 326-327. Henwood, *Cornwall Geol: Trans:* v., pp. 226, 228; viii., p. 676. Smyth (Percy) *Metallurgy*, i., pp. 313-314.

† Pryce, *Mineral*: *Cornub:* p. 75. Henwood, *Edin*: *New Phil*: *Journal*, xxii., p. 157. *Cornwall Geol*: *Trans*: v., pp. 190-194; viii., p. 680. De la Beche, *Report*, p. 327. Von Cotta, *Ore-Deposits*, p. 418.

‡ Pryce, *Mineral*: *Cornub*: p. 92. Klaproth, *Fossils of Cornwall*, pp. 21, 42-58. Berger, *Geol*: *Trans*: i., p. 167. Phillips, (W.), *Ibid*, ii., p. 154. Thomas, (R.), *Report*, p. 20. Fox, *Reports of the Royal Corn*: *Pol*: *Society*, iv., p. 95. Henwood, *Cornwall Geol*: *Trans*: v., p. 207; viii., p. 677-678.

§ Borlase, *Natural History*, p. 210. Pryce, *Mineral*: *Cornub*: p. 58. Klaproth, *Fossils of Cornwall*, p. 30. Polwhele, *Cornwall*, iv., p. 134. Berger, *Geol*: *Trans*: i., p. 173. Lysons, *Cornwall*, ccix. C. S. Gilbert, *Cornwall*, i., p. 259. Hitchins and Drew, *Cornwall*, i., p. 624. Carne, *Cornwall Geol*: *Trans*: i., p. 120; ii., pp. 112, 113. Michell, *Manual of Mineralogy*, pp. 9, 14. Boase, *Cornwall Geol*: *Trans*: iv., p. 193. Davies Gilbert, *Cornwall*, iii., p. 47. Fox, *Reports of the Royal Corn*: *Pol*: *Society*, iv., p. 101. De la Beche, *Report*, pp. 284, 287, 610-612. Hunt, *Mineral Statistics*, Passim. Allen, *History of Liskeard*, pp. 421, 422, 425, 426, 431, 432. Henwood, *Cornwall Geol*: *Trans*: v., pp 54, 108, 140, 193, 255, 268; viii., pp. 707-711, 720; *Reports of the Royal Institution of Cornwall*, xxxiii., pp. 39-43. Giles, *Cornwall Geol*: *Trans*: vii., pp. 200-207. Salmon, *Mining and Smelting Magazine*, ii., pp. 78-84, 211-218. Webb and Geach, *Caradon and Liskeard District*, pp. 16-24, 26-27, 36-38.

‖ Nearly, if not quite, forty years ago, an *Encrinite* was discovered by the late Mr. W. Mansel Tweedy—sometime *President of the Royal Institution of Cornwall*,—in slate adjoining the *lode* at *Goonhavern* in Perranzabuloe.

¶ Henwood, *Cornwall Geol*: *Trans*: v., pp. 208-210; viii., pp. 679, 708.

proportions of tin and of copper obtained by the smelter from crude vein-stone extracted by the miner were respectively estimated in

1778, proportion of tin in ore 0·020381* proportion of copper in ore 0·020000*
1862, ,, 0·013000†‡ ,, 0·021250†§
1869, the ores of the most productive tin-mine afforded ..... 0·013000,‡‖

their weight of metal.¶ It is a remarkable fact that in all *lodes*, whatever may be the nature of their produce, the parts most highly inclined are always the most productive.** Most bodies (*courses*), as well of tin, as of copper-ore have within their respective *lodes* an endlong dip or *shoot*,†† which usually approximates

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* Pryce, *Mineral*: *Cornub*: p. 186.

† Moissenet, *Annales des Mines*, 6me Série, ii., p. 252.

‡ The tin-ore of Cornwall affords on an average (13 parts in 20) 0.650000 its weight of metal.

§ The mean percentage of metal obtained from the copper-ores of Cornwall is (6¾) 0·061250 its weight. Hunt, *Mining Statistics*, 1857-1867.

‖ Thomas, *Journal of the Royal Institution of Cornwall*, iii., p. 193.

¶ On the southern shore of Lake Superior—the vein-stones of—
The *Northwest* mine afforded .. 0·013600 their weight of native copper,
,, *Clift* ,, ,, .. 0·163000 ,, ,,
Whitney, *Metallic Wealth of the United States*, p. 271.
Henwood, *Cornwall Geol*: *Trans*: viii., p. 435.

At Chañarcillo in Chili the vein-stones of the *Colorada* mine during 1855-1856 yielded from 0·012964 to 0·012966 their weight of silver.
Henwood, *Cornwall Geol*: *Trans*: viii., p. 97.

In North Wales, the vein-stones at *Clogau* yielded from 0·000002 to 0·045765 and averaged 0·000043 their weight of gold.
Henwood, *Cornwall Geol*: *Trans*: viii., p. 641. *Table* xxii.

At Berezovsk in the Ural the vein-stones wrought from 1745 to 1841 yielded on an average 0.000013 their weight of gold.
Murchison, De Verneuil and Von Keyserling, *Russia in Europe*, i., p. 476.

		Their weight of Gold.	
In Nova Scotia, various vein-stones yielded from		0·000025	to 0·000032
,, Virginia, ,, ,, ,,		0·000005	,, 0·035659
,, Brazil, the vein-stones of	*Catta Branca* ,,	0·000007	,, 0·000019
,, ,,	*Morro Velho* ,,	0·000010	,, 0·000036
,, ,,	*Agoa Quente* ,,	0·000001	,, 0·016988
,, ,,	*Don Pedro* ,,	0·000008	,, 0·002364
,, ,,	*Gongo Soco* ,,	0·000001	,, 0·521173

Henwood, *Cornwall Geol*: *Trans*: viii., pp. 179-384. *Table* xxii.

** Thomas, *Report*, p. 20. Henwood, *Edin*: *New Phil*: *Journal*, xxii., p. 158; *Cornwall Geol*: *Trans*: v., p. 231; viii., p. 705. Fox, *Reports of the Royal Corn*: *Pol*: *Society*, iv., p. 87. Burr, *Mining Review*, iii., p. 169. De la Beche, *Report*, p. 324.

†† Henwood, *Edin*: *New Phil*: *Journal*, xxii., p. 157; *Cornwall Geol*: *Trans*: v., p. 193. Fox, *Reports of the Royal Corn*: *Pol*: *Society*, iv., p. 95. De la Beche, *Report*, p. 336.

to the contour and *bedding* of the neighbouring granite* and to the inclination of the cleavage-planes in the adjacent slates.† In each of our several mining districts the *lodes* are productive on similar lines taken at right-angles to their respective directions; hence the phrase "ore against ore;"‡ but as the directions of the *lodes* vary in different districts, the directions of these productive lines are not always the same.§ *Lodes* and *branches* are often rich at their junctions; particularly if they interfere—whether horizontally or vertically—at acute angles.‖ And where joints in the rock unite with them on the line of their dip they are sometimes productive. The separation of veins and joints—on the contrary—tends to poverty. *Lodes* of soft or granular character, on encountering rocks of more than ordinary hardness, split into *branches*;¶ or it may be said—with perhaps equal accuracy—that the entire body, as well of *lode* as of (*country*) rock assumes, for some distance, a veined structure. On the other hand, similar appearances sometimes attend the passage of *lodes* through unusually soft strata.** Generally speaking, however, hardish rocks are more congenial to tin, than to copper, *lodes*.†† Both in granite and in *elvan* a well-defined porphyritic structure is a most unpromising character;‡‡ whilst a gradual blending of the included crystals with the basis is, in both rocks, considered an encouraging circumstance.§§ Transverse joints appear to exercise an

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* Carne, *Cornwall Geol*: *Trans*: ii., p. 94. Boase, *Ibid*, iv., pp. 350, 366. Henwood, *Edin: New Phil*: *Journal*, xxii., p. 158; *Cornwall Geol*: *Trans*: v., pp. 45, 194; viii., p. 672. De la Beche, *Report*, p. 336.

† Fox, *Reports of the Royal Corn*: *Pol*: *Society*, iv., p. 95. De la Beche, *Report*, p. 336.

‡ Carne, *Cornwall Geol*: *Trans*: iii., p. 78. Henwood, *Edin*: *New Phil*: *Journal*, xxii., p. 157; *Cornwall Geol*: *Trans*: v., pp 215-219. Fox, *Reports of the Royal Corn*: *Pol*: *Society*, iv., p. 88.

§ Henwood, *Cornwall Geol*: *Trans*: v., pp. 215-234.

‖ Pryce, *Mineral*: *Cornub*: p. 103. Phillips, (W.), *Geol*: *Trans*: ii., p. 115. Carne, *Cornwall Geol*: *Trans*: ii., p. 100. Fox, *Reports of the Royal Corn*: *Pol*: *Society*, iv., p. 87. Burr, *Mining Review*, iii., p. 176. De la Beche, *Report*, p. 333. Henwood, *Cornwall Geol*: *Trans*: v., p. 233. Von Cotta, *Ore-Deposits*, p. 420.

¶ Pryce, *Mineral*: *Cornub*: p. 104. Thomas, (R.), *Report*, p. 17. De la Beche, *Report*, pp. 331-332. Henwood, *Cornwall Geol*: *Trans*: v., p. 212, 221; viii., p. 677. Von Cotta, *Ore-Deposits*, p. 419.

** Henwood, *Cornwall Geol*: *Trans*: v., p. 213.

†† Pryce, *Mineral*: *Cornub*: p. 95. Fox, *Reports of the Royal Corn*: *Pol*: *Society*, iv., p. 117. De la Beche, *Report*, p. 336. Henwood, *Cornwall Geol*: *Trans*: v., pp. 226-229.

The harder are much richer than the softer portions of the great auriferous deposit at *Morro Velho* in Brazil. *Ibid*, viii., pp. 199-206, *Tables* vii., xxii.

‡‡ *Ibid*, v., p. 225. Thomas, (C.), *Geology of Cornwall and Devon*, p. 16.

§§ Henwood, *Cornwall Geol*: *Trans*: v., p. 225; viii., p. 663.

unfavourable influence on the produce of *lodes;* bodies *(courses)* of ore sometimes terminating abruptly at a joint.* The cleavage-planes of the slates are almost invariably contorted whenever the rock is quartzose; in such cases it is usually fissile, and the laminæ are highly inclined; either of these conditions is accounted inauspicious. On the other hand, when the planes of cleavage are free from curvature and moderately inclined, and when the rock is of thick-lamellar structure, the *lodes* which traverse it may hold out fair promise. The fissile slates are frequently hard; whilst the thick-bedded varieties are usually much softer.†

For several years past the chief produce of two, almost adjoining tin-mines of great importance has been obtained from deposits,‡ of which examples are yet unknown in other parts of Cornwall. They all anastomose with *lodes;* and these, in the two most notable instances, bear 17°—25° S. of E.—N. of W., one being nearly perpendicular, the other generally dipping S. At their contact with the *lodes*, to which these repositories are respectively united, one of them measures no more than a few inches in height and width, but the other is some fifteen fathoms in vertical extent and about five feet wide. From this contact one bears about 35° S. of E.—N. of W., the other perhaps 25° S. of E.—N. of W.; in their devious ranges, however, one preserves a certain parallelism with,—and occasionally touches and enriches, —a *(trawn) cross-vein;* whilst the other takes the course of,—and now and then grazes—a *lode*, which is sometimes productive, notwithstanding its approximation to the strike of neighbouring *cross-veins.* In different parts of the considerable distances throughout which both have been explored, they vary from a few inches to at least sixty feet, as well in width as in height; thus lacking that great vertical range which is so essential a character of all *lodes*, and resembling rather the *pipe-veins*§ of Carboniferous districts, in that they are bounded above, below, and on both sides, by barren *(Country)* rocks. Both decline towards the S.E.; the one about ten, the other nearly eight, degrees. Their principal earthy constituents are quartz, schorl, and felspar; their matrix, how-

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* Fox, *Reports of the Royal Corn*: *Pol*: *Society*, iv., p. 93. Henwood, *Cornwall Geol*: *Trans*: v., pp. 25, 225.

† Carne, *Ibid*, iii., p. 81. De la Beche, *Report*, p. 336. Henwood, *Cornwall Geol*: *Trans*: v., p. 225. Thomas, (C.), *Geology of Cornwall and Devon*, p. 20. Von Cotta, *Ore-Deposits*, p. 419.

‡ Henwood, *Cornwall Geol*: *Trans*: v., pp. 21-24, *Table* xvi., *Pl.* ii., *Fig.* 4, 5; *Ibid*, vii., pp. 179-184, *Table* i., *Pl.* viii., *Fig.* 1, 2, 3. Salmon, *Mining and Smelting Magazine*, iii., pp. 139-148, *Fig.* 11, 12, 13, 14.

§ Forster, *Section of the Strata from Newcastle to Cross Fell*, pp. 246 to 249, 256. Whitney, *Metallic Wealth of the United States*, pp. 413-414.

ever, contains the first two in larger, but the last in smaller, proportion than the vein-stones of adjacent tin-*lodes*. The *bunches*, threads, vein-like masses, and other off-shoots from all sides of both, together with their numerous reticulations in the contiguous rock, form no unimportant addition to their produce. Between them and the containing granite a gradual assimilation sometimes takes place; but from one to the other, the passage is often abrupt and immediate. Metallic matter is, perhaps, distributed less uniformly in them than in the neighbouring *lodes;* but portions of both have been exceedingly rich. Similar, but smaller, off-shoots spring from the *lodes* of several neighbouring mines; but those (the so-called *Carbonas**) of the *Saint Ives Consolidated*† and of the *Providence* mines only have been wrought to advantage; of these only, the produce during the last forty years has, however, realized more than one million and a half sterling.

Masses of felspathic, schorlaceous, and quartzose matter, more or less mixed with tin-ore,‡ are sometimes isolated in the granite of the same region.

A numerous and an important, though generally an unproductive, class of veins, is known as *Guides*§ in one district, as *Trawns*‖ in another, and—as quartz or clay is their chief constituent—as *Cross-courses*¶ and *Flucans*** elsewhere. Now and then

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* This term—an unknown one in any other part of the County—was applied, some sixty years since, to a similar formation wrought in the adjoining mine of *Rosewall-Hill*. Whether the prevalent opinion that it was a cant word then current in the neighbourhood, is, or is not, correct we have now no means of ascertaining; but there seems little doubt that it was first employed by persons who were unacquainted with the ancient language of Cornwall.

† Fine specimens of blistered copper-pyrites and magnificent crystals of vitreous copper are still obtained from this deposit.

‡ Hawkins, *Cornwall Geol*: *Trans*: ii., p. 31. Henwood, *Ibid*, v., p. 20. Salmon, *Mining and Smelting Magazine*, v., p. 261.

§ Carne, *Cornwall Geol*: *Trans*: ii., pp. 109, 323. Henwood, *Edin*: *New Phil*: *Journal*, xxii., p. 159. Fox, *Reports of the Royal Corn*: *Pol*: *Society*, iv., p. 93.

‖ Henwood, *Cornwall Geol*: *Trans*: v., p. 19.

¶ Pryce, *Mineral*: *Cornub*: p. 98. Thomas, (R.), *Report*, p. 21. Phillips, (W.), *Geol*: *Trans*: ii., p. 134. Carne, *Cornwall Geol*: *Trans*: ii., pp. 85, 107. Henwood, *Edin*: *New Phil*: *Journal*, xxii., p. 159; *Cornwall Geol*: *Trans*: v., pp. 278-281, *Table* 106; viii., p. 681. Fox, *Reports of the Royal Cornwall Polytechnic Society*, iv., p. 83. De la Beche, *Report*, pp. 301, 303, 305, 306, 307. Von Cotta, *Ore-Deposits*, p. 407.

** Pryce, *Mineral: Cornub:* p. 100 Berger, *Geol: Trans:* i., p. 165. Phillips, (W.), *Ibid*, ii., p. 134. Thomas, (R.), *Report*, p. 24. Carne, *Cornwall Geol: Trans:* ii., pp. 85, 114. Hawkins, *Ibid*, p. 229. Henwood, *Ibid*, iii., p. 329; v., p. 257, 262, 266; viii., pp. 715, 716; *Edin: New Phil: Journal*, xxii., p. 159. Fox, *Reports of the Royal Corn: Pol: Society*, iv., pp. 83, 88. Von Cotta, *Ore-Deposits*, p. 407.

one of them is intersected by a metalliferous vein,* but generally they make their way through rocks† and lodes alike and without interruption.‡ Their mean direction throughout the County is about S.E.—N.W.;§ a course not materially different from that of one of the most distinctly developed series of joints in the rocks.‖ The average inclination of such as maintain the general range is, perhaps, 80°;¶ whereas of those which bear nearly E. and W. it scarcely exceeds 60°;** moreover—whatever relation (if any) may subsist between their directions, and the amounts of their inclinations—they dip more frequently *towards* than *from* the granite.†† They are wider in granite than in slate; and at great than at small depths.‡‡ As the *cross-veins* affect the structure and partake the nature of the adjoining rocks, they become more quartzose whilst traversing the slates which abound in *strings*

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* Carne, *Cornwall Geol: Trans:* ii., p. 110. Henwood, *Proceedings of the Geol: Society*, i., p. 405.; *Reports of the British Association*, vi., Part ii., p. 74; *Edin: New Phil: Journal*, xxii., p. 163. *Cornwall Geol: Trans:* v., pp. 287-289; vii., p. 183; viii., p. 685.

† Sir H. T. De la Beche's Report, pp. 297-298, describes and figures a displacement of the granite by the *great cross-course* near *Treskerby;* but neither the *Ordnance Geological Map*, coloured by him at the same time, nor Mr. Thomas's *Geological Map of the Mining District*, published seventeen years earlier, shows anything of the kind.

‡ Pryce, *Mineral: Cornub:* p. 98. Berger, *Geol: Trans:* i., p. 165. Phillips, (W.), *Ibid*, ii., p. 134. Thomas, (R.), *Report*, p. 21. Carne, *Cornwall Geol: Trans:* ii., p. 108. Fox, *Reports of the Royal Corn: Pol: Society*, iv., p. 83. De la Beche, *Report*, pp. 297, 303. Henwood, *Cornwall Geol: Trans:* v., p. 256; viii., p. 682. Von Cotta, *Ore-Deposits*, p. 417.

§ The mean directions of *cross-veins* in the different districts are—in

Saint Just....	26° N. of E.—S. of W.	Redruth, &c...	35° S. of E.—N of W.
Saint Ives....	38° S. of E.—N. of W.	Saint Agnes ..	39° E. of S.—W. of N.
Marazion	41° S. of E.—N. of W.	Saint Austell..	21° S. of E.—N. of W.
Gwinear, &c..	43° E. of S.—W. of N.	Menheniot, &c.	3° N. of E —S. of W.
Helston.....	21° S. of E.—N. of W.	Caradon.....	13° E. of S.—W. of N.
Camborne, &c.	34° E. of S.—W. of N.	Callington....	43° S. of E.—N. of W.

Henwood, *Cornwall Geol*: *Trans*: v., p. 279; Table 106; viii., pp. 681, 715.

‖ *Ibid*, v., p. 279, *Tables* 99, 106; viii., pp. 673, 681.

¶ *Ibid*, v., p. 277; viii., p. 682.

** *Ibid*, viii., p. 715; Ormerod, *Quarterly Journal of the Geol: Society*, xxv., p. 275. *Ante*, p. 17.

†† Henwood, *Cornwall Geol: Trans:* v., p. 277; viii., p. 682; *Ante*, p. 17.

‡‡ *Cross-veins* in granite average..... 4·9 feet in width;
,, ,, slate ,, ... 3·5 ,, ,,
,, at less than 100 fms. deep average 4·0 ,, ,,
,, ,, more ,, ,, ,, 4·4 ,, ,,

Henwood, *Cornwall Geol*: *Trans*: v., p. 276, *Table* 104; viii., p. 685, 715.

(Country branches) of quartz than they are elsewhere. Such portions are frequently intersected by undulating joints, which—approximately coinciding, as well with them as with similar divisions of the strata, in direction—divide them into subordinate veins of variable thickness. The faces of these joints,—like the faces of joints in the *lodes*,*—are often scored with unconformable striæ. Moreover they, not uncommonly, split into *branches* as well vertically as horizontally; and these sometimes dwindle, but frequently they reunite; occasionally also *cross-veins* are developed at certain depths only, and disappear both vertically and horizontally within very short distances.† The *cross-veins* partake the nature of every rock,—and indeed of every vein—they traverse; and thus in granite—notwithstanding the occurrence of quartz at intervals—their principal ingredients are granitic;‡ and, when these are coarse and porphyritic, the crystals of felspar often assume somewhat coincident positions;§ in homogeneous slate, on the contrary, they, not uncommonly, consist of slaty clay, and then are called *flucans;* || such parts of them—even when very soft—are, frequently of the same structure—whether fissile or thick-lamellar—and the planes of their cleavage incline at the same angles as in the adjoining *(Country)* rocks;¶ occasionally, however, both the slates and the *cross-veins* are, more or less, siliceous, and under such conditions small spheroidal masses—made up of quartz and of slate in alternating laminæ—are, at rare intervals, imbedded in the latter;** moreover considerable portions of many *cross-veins* consist of quartz, sometimes of massive character, but not unusually crystallized in irregular prisms disposed horizontally, at right angles to the strike of the *walls* and joints.†† In the vicinity of *cross-veins*, the rock is often thinly sliced by narrow strings of quartz.‡‡ Silver and copper together with many ores of both

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* *Ante*, p. 18.

† Henwood, *Cornwall Geol: Trans:* v., pp. 66, 89, 381.

‡ *Ibid*, v., pp. 257, 264; viii., p. 682.

§ *Ibid*, viii., pp. 682-683.

|| Phillips, (W.), *Geol: Trans:* ii., p. 134. Thomas, (R.), *Report*, p. 24. Carne, *Cornwall Geol: Trans:* ii., p. 107. Fox, *Reports of the Royal Corn: Pol: Society*, iv., p. 85. De la Beche, *Report*, p. 318. Henwood, *Cornwall Geol: Trans*: v., pp. 266. Von Cotta, *Ore-Deposits*, p. 407.

¶ Henwood, *Cornwall Geol: Trans*: v., pp. 263-264, *Tables* xxxiv., xxxvii., lxix.

** *Ibid*, p. 262, *Table* lxxxvii.

†† Fox, *Phil: Trans*: cxx., p. 406. *Reports of the Royal Corn: Pol: Society*, iv., p. 89. De la Beche, *Report*, *Fig.* 62, 63, 64, 65. Phillips, (Prof.), *Cabinet Cyclopædia*, Geology, ii., p. 132. Henwood, *Cornwall Geol: Trans*: v., p. 261.

‡‡ *Ibid*, v., pp. 257, 260, *Tables* lxix., xcvi.

these, and of several other metals* occur in *cross-veins;* but they are mostly—though by no means universally—limited to such portions of them as (*heave*) sever neighbouring *lodes* in which similar metals and ores prevail.† Many of our richest repositories of lead-ore have, however, the same directions and mineral characters as the principal *cross-veins.* Both the rocks and the *lodes* are intersected by the *cross-veins,* of which the quartzose portions afford almost the only uninterrupted natural channels for the circulation of water underground; whilst those parts which consist only of (*flucan*) clay are, on the contrary, so thoroughly impermeable that they are often chosen as the boundaries of (*Setts*) mining-leases.‡

The *Slides* have been observed, hitherto, in the schistose rocks of certain districts§ only. Their direction—which approximates, but is not accurately parallel to, that of the *lodes*—averages less than 20° N. of E.—S. of W.;‖ but they incline differently; their width ranges from less than an inch to more than a foot, and slaty-clay is their only ingredient.¶

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* Pryce, *Mineral: Cornub*: pp. 48, 50. Hitchins, *Phil: Trans*: li., (1801), p. 159. Phillips, (W.), *Geol: Trans*: ii., pp. 135, 148. Carne, *Cornwall Geol: Trans*: ii., pp. 112-113. Fox, *Reports of the Royal Corn: Pol: Society*, iv., p. 90. De la Beche, *Report*, pp. 288-301, 304. Henwood, *Cornwall Geol: Trans*: v., pp. 267-273; vii., p. 183, *Table* i.; viii., pp. 111, 112, 710, 711. Williams, (R. H.), *Reports of the Royal Institution of Cornwall*, xxxix., p. 32-33. Salmon, *Mining and Smelting Magazine*, ii., pp. 78-83. Webb and Geach, *Caradon and Liskeard District*, pp. 18-24. Von Cotta, *Ore-Deposits*, p. 417.

† Berger, *Geol: Trans*: i., p. 166. Phillips, (W.), *Ibid*, ii., p. 149. Fox, *Reports of the Royal Corn: Pol: Society*, iv., p. 89. Henwood, *Cornwall Geol: Trans*: v., pp. 270-273; vii., p. 183.

‡ Pryce, *Mineral: Cornub*: p. 100. Phillips, (W.), *Geol: Trans*: ii., p. 134. Thomas, (R.), *Report*, p. 24. Carne, *Cornwall Geol: Trans*: ii., p. 115. Fox, *Reports of the Royal Corn: Pol: Society*, iv., pp. 116, 132. Buckland, *Bridgewater Treatise*, i., p. 546. Henwood, *Cornwall Geol: Trans*: v., p. 258.

§ *Ibid*, v., p. 282; viii., p. 686.

‖ Proportionate numbers of *slides*, coursing in different directions:

Proportion	0·1	direction	25° E. of S.—W. of N.
,,	0·3	,,	N.E.—S W.
,,	0·1	,,	35° N. of E.—S. of W.
,,	0·2	,,	25° N. of E.—S. of W.
,,	0·1	,,	E.—W.
,,	0·1	,,	S.E.—N.W.
,,	0·1	,,	25° E. of S.—W. of N.
Mean	.....	,,	19° N. of E.—S. of W.

Henwood, *Cornwall Geol: Trans*: v., p. 231.

¶ Pryce, *Mineral: Cornub*: p. 106. Phillips, (W.), *Geol: Trans*: ii., p. 136. Williams, (J.), *Ibid*, iv., p. 143. Thomas, *Report*, p. 21. Carne, *Cornwall Geol: Trans*: ii., p. 116. Hawkins, *Ibid*, ii., p. 232. Henwood, *Proceedings of the Geol: Society*, i., p. 405; *Cornwall Geol: Trans*: v., pp. 281-283. Pike, *Quarterly Journal of the Geol: Society*, xxii., pp. 535-537. Von Cotta, *Ore-Deposits*, pp. 407-408.

It is scarcely more important that the practical miner should acquaint himself with the several changes of character which accompany a passage from the poorer to the richer parts of his *lode*, than that—when one vein has dislocated another—he should know whether the chances of successful search for the severed vein are greatest towards the *right* or the *left-hand** in case of horizontal (*heave*) displacement,—*upward* or *downward* † if the displacement be (a *leap* or *throw*) *vertical*;—or towards the greater‡ or the smaller§ angle in either case. Of 272 *lodes* traversed by *cross-veins* in different parts of Cornwall ||—

57	or	0·20	of the whole number are intersected, but not (*heaved*) displaced;					
135	,,	0·50	,,	are (*heaved*) displaced towards the *right-hand*;				
80	,,	0·30	,,	,,	,,	,,	*left*	,,
181	,,	0·67	,,	,,	,,	,,	greater angle;	
34	,,	0·13	,,	,,	,,	,,	smaller	,,

The extent of (*heave*) displacement towards the *right-hand* averages							17·7	feet;
,,	,,	,,	,,	*left*	,,	,,	12.6	,,
,,	,,	,,	,,	greater angle	,,	,,	15·9	,,
,,	,,	,,	,,	smaller	,,	,,	16·0	,,
,,	,,	,,	throughout the County		,,	,,	15·9	,,

Nor can the enquiry whether the direction or the extent of the (*heave*) displacement depends on—the nature of the adjoining rock, —the composition, width, or inclination of the *lode* and the *cross-vein*,—or on the angle of their incidence, be unimportant.

The intersections,	unaccompanied by (*heaves*) displacement are in granite	0·26,¶	in slate	0·21¶	of the whole;
,,	attended by (*heaves*) displacements towards the *right-hand* in granite ..	0·52,	,,	0·51	,,
,,	attended by (*heaves*) displacements towards the *left-hand* in granite	0·22,	,,	0·28	,,

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* "The directions of the *heaves* are generally expressed by *right* and *left*, "because the same expression serves on approaching them from either side; "if the terms *north* and *south* be used, it must be also said whether they are "approached from the east or west." Thomas, (R.), *Report*, p. 22. Carne, *Cornwall Geol*: *Trans*: ii., p 86.

† Pryce, *Mineral*: *Cornub*: p. 106. Carne, *Cornwall Geol*: *Trans*: ii., p. 86,

‡ Hawkins, *Ibid*, ii., p. 228.

§ Pryce, *Mineral*: *Cornub*: *Pl* i, *Fig.* 3, 4.

|| Henwood, *Cornwall Geol*: *Trans*: v., pp. 286-287; viii., pp. 683-684, 717.

¶ *Ibid*, v., p. 296.

The intersections, attended by (*heaves*) displacements towards greater angle in granite ..... } 0·66, in slate 0·64 of the whole;

,, attended by (*heaves*) displacements towards the smaller angle ..... } 0·8, ,, 0·15 ,,

,, attended by (*heaves*) displacements average ..... } 17·1 ,, 16·3 feet.

When *lodes* affording the ores of different metals are intersected by *cross-veins*, the results are*

Nature of Ores contained in the *lodes*.	Lodes intersected, but not (*heaved*) displaced.	Lodes (*heaved*) displaced towards the			
		Right hand.	Left hand.	Greater Angle.	Smaller Angle.
Tin-ore	0·18	0·56	0 26	0·52	0·30
Tin & Copper-ore	0·37	0·44	0·19	0·56	0·07
Copper-ore	0·18	0·52	0·30	0·74	0·08

The *lodes* yielding tin-ore are, on an average (*heaved*) displaced.. 15·4 feet;
,, ,, the ores of both tin and copper.. ,, ,, ,, 14·6 ,,
,, ,, copper-ore ..... ,, 17·5 ,,

The intersections of *lodes* by *cross-veins* of different mineral character afford the following results†

Nature of *cross-veins*.	Lodes intersected, but not (*heaved*) displaced.	Lodes (*heaved*) displaced, towards the			
		Right hand.	Left hand.	Greater Angle.	Smaller Angle.
Quartz (*cross-courses*)	0·29	0·44	0·27	0·59	0·12
Slaty-clay (*flucans*) ..	0·18	0·55	0·27	0·70	0·12

The mean distances to which the *lodes* are (*heaved*) displaced by *cross-veins* of different kinds† are—

Nature of the *cross-vein*.	Amount of (*heave*) displacement, towards			
	Right hand.	Left hand.	Greater angle.	Smaller Angle.
Quartz (*cross-course*)	12·3 feet	7·1 feet	9·3 feet	16·3 feet
Slaty-clay (*flucan*)	24·4 ,,	15·3 ,,	21·7 ,,	20·2 ,,

* Henwood, *Cornwall Geol*: *Trans*: v., pp. 286-287.
† *Ibid*, v., pp. 291-292.

The mean distance to which *lodes* in general are (*heaved*) displaced by *cross-veins**

Of less than one foot in width, is ..... 12·5 feet;
,, more ,, ,, ,, ... 23·0 ,, †

The mean distance to which *lodes* averaging

Less than two feet in width‡ are (*heaved*) displaced is .. 9·1 feet;
More ,, ,, ,, ,, ,, ,, .. 24·6 ,,

The mean distance to which

Lodes of more than two feet § are displaced (*heaved*) by *cross-veins* of more than one foot§ wide..... is 28·3 feet;
Lodes of less than two feet are displaced (*h aved*) by *cross-veins* of more than one foot wide ..... is 16·1 feet;
Lodes of more than two feet are displaced (*heaved*) by *cross-veins* of less than one foot wide ..... is 17·0 feet;
Lodes of less than two feet are displaced (*heaved*) by *cross-veins* of less than one foot wide..... is 4·8 feet.

The results consequent on the intersections of oppositely-inclined *lodes* by oppositely-dipping *cross-veins* are observed in the undermentioned proportions.‖

Results of Intersection.	Lodes, dipping N.		Lodes, dipping S.	
	Cross-veins dipping E.	*Cross-veins* dipping W.	*Cross-veins* dipping E.	*Cross-veins* dipping W.
Lodes intersected simply..	0·15	0·40	0·15	0·23
,, displaced towards right hand.....	0·52	0·42	0.56	0·56
,, displaced towards left hand	0·33	0·18	0·29	0·21
,, displaced towards greater angle...	0·71	0·42	0·76	0·70
,, displaced towards smaller angle ..	0·14	0·18	0·09	0·07

The several proportions of simple intersections, and of displacements of *lodes* by *cross-veins*—whether towards the right or

* Pryce, *Mineral*: *Cornub*: p 98. Henwood, *Cornwall Geol*: *Trans*: v., p. 298; viii., p. 685.

† Two *(heaves)* dislocations of 30 and of 45 fathoms respectively are excluded from this computation.

‡ Henwood, *Cornwall Geol*: *Trans*: v., p. 299.

§ *Ibid*, v., p. 300; viii., p. 685.

‖ *Ibid*, v., p. 303; viii., pp. 683-684.

left-hand—the greater or smaller-angle,—and the extent of displacement under different angles of incidence, are—*

Angle of incidence.	Lodes simply intersected.	Lodes, *(heaved)* displaced towards the				Extent of *(heave)* displacement.
		Right-hand.	Left-hand.	Greater Angle.	Smaller Angle.	
0°—10°	—	—	—	—	—	—
10°—20°	×	×	—	×	—	6·0 feet.
20°—30°	0·01	0·03	×	0·03	×	15·3 ,,
30°—40°	0·01	0·02	0·02	0·02	0·01	24·2 ,,
40°—50°	×	0·04	0·03	0·05	0·02	32·4 ,,
50°—60°	0·03	0·03	0·03	0·05	×	19·4 ,,
60°—70°	0·05	0·06	0·05	0·11	0·01	12·4 ,,
70°—80°	0·04	0·14	0·07	0·15	0·06	15·9 ,,
80°—90°	0·09	0·18	0·07	0·22	0·04	14·3 ,,

Proceeding from general results to particulars.—One instance, at least, is on record of a *lode* and a *cross-vein* each alternately intersecting the other twice, at different depths in the same mine.† The general rule is that the displacement of the same lode by the same *cross-vein* is in the same direction (towards the same *hand*,‡ though to unequal distances at different depths;§ yet cases are not unknown of the same *lodes* being *heaved* towards the *right-hand* at one, but to the left at another, spot;‡ indeed the contour of the parts of *(heaved)* displaced *lodes* in contact with opposite *(walls)* sides of *(heaving)* displacing *cross-veins* have often but a slight—and sometimes scarcely any resemblance.‖ Most of the *lodes* traversed by the same *cross-vein* are either simply intersected or *heaved* the same way; nevertheless one, here and there, is sometimes displaced in the opposite direction; such exceptional cases, however, amount to only 0·037 of the whole number observed.¶ The same *lodes* are frequently intersected by several, nearly parallel, *cross-veins;* but—though only a few fathoms apart—they sometimes suffer different *(heaves)* displacements.**

The *elvans* traverse the same districts as the *lodes*, and—owing to slight differences in direction and dip—are frequently inter-

* Pryce, *Mineral*: *Cornub*: p. 99. Hawkins, *Cornwall Geol*: *Trans*: ii., p. 228. Henwood, *Ibid*, v., p. 301.

† Henwood, *Cornwall Geol*: *Trans*: v., p. 326.

‡ *Ibid*, v., pp. 313-314.

§ *Ibid*, v., pp. 308-309; vii., p. 182; viii., p. 717.

‖ *Ibid*, v., pp. 377-379, *Pl.* xii., *Fig.* 15-20.

¶ *Ibid*, v., pp. 320-324; vii., pp. 182-183; viii., pp. 683-684.

** *Ibid*, v., pp. 316-320; vii., p. 183; viii., pp. 683-684, 717.

sected by them. The *cross-veins* cut through both; but whilst—in one part or other of their vertical range—they *heave* hundreds of the *lodes*, they displace scarcely half a dozen of the scores of interlying *elvans* which they intersect in the selfsame mines.*

Of vertical intersections we possess only sixteen examples; a number insufficient to afford grounds for safe conclusions. It is, however, not unworthy of remark that the *(Leaps, Throws)* displacements of *tin-lodes* by *slides* are *upward* and towards the *smaller* angle; whilst *copper-lodes* present either simple intersections or *leaps downward* towards the greater angle.†

Whether exploratory works are opened in *(cross-cuts)* drifts through the *(Country)* rocks for recovering *lodes* which have been *(heaved)* displaced by *cross-veins*, or on the *courses* of the *lodes* themselves in search of the ores they contain, they must —of necessity—be directed immediately *towards*, or as immediately *from* the object of pursuit. But, although it is impossible to overvalue general rules for the guidance of the miner, it must be confessed that neither practice nor theory has yet supplied any of general application. A more extended experience, and a more careful array of facts seem our only resource. But when the vast variety of ever-changing circumstances is considered, we can only hope that our conjectures will at length attain greater probability; and that—if they fail of absolute certainty—they will, at least, lead us nearer to the truth.

As no undertaking can be advantageously, or, perhaps even safely, carried on without knowledge of its current financial operations; it is important that the speculator should learn the general results attending mining proceedings on a large scale.

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* Hawkins, *Cornwall Geol*: *Trans*: i., p. 151, *Pl.* v. Williams, *Geol*: *Trans*: iv., p. 142, *Pl.* vii., *Fig.* 1. Thomas, *Mining Review*, No. viii., (1836), p. 275. Boase, *Primary Geology*, p. 54. Henwood, *Cornwall Geol*: *Trans*: v., pp. 67, 90, 91, 104, 127.

In one well-known case a *cross-vein* which is *heaved* by a *lode heaves* two other *lodes;* the several portions of one of them being contained in slate on one side of the *cross-vein* but in *elvan* on the other. The *elvan* itself is simply intersected. Henwood, *Reports of the British Association*, vi., Part ii., p. 74; *Cornwall Geol*: *Trans*: v., p. 325.

The displacement of two *lodes* by an elvan at *Polgooth*, described, in 1791, by Captain Phillips to Mr. Hawkins *(Cornwall Geol: Trans*: i., pp. 151-152, *Pl.* v.), was carefully examined by me in 1831, *(Cornwall Geol*: *Trans*: v., pp. 128, 327, *Pl.* ix., *Fig.* 10).

† Henwood, *Cornwall Geol*: *Trans*: v., p. 332.

It has been stated*—on authority represented to be unquestionable—that during nine years past

The dividends in Cornish mines have amounted to £1,379,936
„ calls „ „ 2,696,800

The vicissitudes of mining, however, are proverbial.†

That the parties engaged in any branch of productive industry should know the proportions in which its proceeds are shared, can admit of no question. Some five years since my friends and acquaintances amongst the Lords, Adventurers, Managers and Pursers of the largest, deepest and most productive tin, copper and lead mines wrought in Cornwall, during the present century, kindly furnished me (for another purpose) with accounts of the

* Years.	Dividends paid.	Calls made.
1862	£174,202	£370,020
3	161,639	402,034
4	174,907	409,940
5	150,369	321,552
6	90,569	431,881
7	116,663	202,779
8	110,350	182,124
9	189,318	181,960
1870	211,919	194,500
Nine years	£1,379,936	£2,696,790

West Briton, (Vol. LXI., No. 3157,) 12th January, 1871.

† "Euerie likelyhood doth [not] euer proue a certaintie: for diuers haue "beene hindered, through bestowing charges in seeking, and not finding, "and many vndone in finding and not speeding, whiles a faire show, tempt- "ing them to mvch cost, hath, in the end, fayled in substance, and made "the aduenturers Banckrupt of their hope and purse. . . . There are, "that leauing [the trade] of new searching doe take in hand such old "*Stream* and *Loadworks*, as by the former aduenturers haue beene giuen "ouer, and oftentimes they find good store of Tynne, both in the rubble "cast vp before, as also in veins which the first workmen followed not. "From hence there groweth a diuersitie in opinion, amongst such Gentle- "men, as by iudgement and experience, can looke into these matters." CAREW, *Survey of Cornwall*, f. 9.

"A striking increase in the value of property occurred with respect to "Downhill, a small coarse tenement in Saint Cleer, which had been pur- "chased thirty years before for £200. . . By the discovery of mineral "lodes, and the opening of West Caradon Copper Mine in this barren spot, "the proprietors have received for the last twelve years, without any risk, "an income of more than £2,000 a year, as dues on the ore. The land- "owner of South Caradon, an equally barren surface, has benefitted to a "still greater extent." ALLEN, *History of Liskeard*, p. 397.

"When the *Colorada lode* (Chili) was small its only ingredient was cal- "careous-spar, but during its enlargement this was mixed with the chloride "of silver and vitreous silver-ore, and great part of it was so thickly inter- "twined with *(bar-silver)* native-silver that,—too tough for extraction with "the ordinary mining tools, and too porous to be blasted with gunpowder— "it was cut out, bit by bit with chisels." HENWOOD, *Cornwall Geol: Trans:* viii., p. 91.

produce, working-costs, *dues* (Royalties), and profits of their works. Fourteen of them*—

Yielded ores which realized		£13,158,203
Expended on labour	£7,388,776	
,, materials	2,283,281	
		£9,672,057
Paid as *dues* (Royalties)		729,506
,, as profits to the Adventurers		2,756,640
		£13,158,203

* Produce, Costs and Profits of sundry productive Mines in Cornwall during the present century.

Mines.	Periods.	Receipts.	EXPENDITURE.				Profits to Adventurers.
	Years.	Produce.	Labour.	Materials, &c.	Working Costs.	*Dues* (Royalties)	Total.	
West Wheal Basset	16·2	£486,975	£210,598	£85,916	£206,514	£31,233	£327,747	£159,228
West Wheal Seton	21·8	454,836	186,768	79,418	266,186	30,322	296,508	158,328
Fowey Consols	27·	1,422,634	906,885	237,706	1,144,591	98,047	1,243,638	179,996
Tresavean	10·8	720,338			326,203	36,331	362,534	357,804
South Caradon	30·	1,001,536			675,088	54,931	730,019	271,517
Botallack	40·	513,405			405,085	23,602	428,687	84,778
Providence	36·	405,367			312,071	14,780	326,851	78,516
Dolcoath	66·	3,087,832			2,714,664	119,355	2,834,019	253,813
Wheal Alfred	11·	715,229			504,175	71,523	575,698	139,531
Consolidated Mines	21·	2,099,485			1,521,290	87,153	1,608,443	491,042
Alfred Consols	16·5	293,152			179,000	16,104	195,104	98,048
Crennis	5·5	298,516			137,947	40,569	178,516	120,000
North Roskear	45·3	859,250			717,393	52,378	769,771	89,479
East Wheal Rose	21·8	799,588			471,850	53,178	525,028	274,560
Totals	.....	£13,158,203	£1,304,251	£403,040	£9,672,057	£729,506	£10,401,563	£2,756,640

In the only three—of the fourteen mines respecting which such particulars have been procured the cost of labour amounted to £1,304,251; of materials, &c. to £403,040; and the entire working cost to £1,707,291.

The £729,506 represents the actual payments, exclusive of about £4,000 at the *Providence* Mines, and of £28,347 at *Dolcoath*, voluntarily relinquished by the Lords (proprietors) of the land, when the returns of the mines were unequal to the costs.

Henwood, *Cornwall Geol.: Trans:* viii., pp. 442-457, *Table* xiv.

The extreme and mean proportions* of these several particulars are—

Objects.	Highest.	Lowest.	Means.
Labour	0·6375	0·4106	0·5615
Machinery, &c.	0·1592	0·1746	0·1735
Working-costs	0·8349	0·4529	0·7350
Dues (Royalties)	0·1360	0·0364	0·0555
Total expenditure	0·9178	0·5033	0·7905
Profits	0·4967	0·0822	0·2095
Total proceeds of ore sold	——	——	1·

* The following columns show the proportions in which the produce of mines yielding various metals and ores is appropriated in different other countries.

Apportionments.	MINES of					
	Copper Ore, in			Native Copper in the United States.	Silver and its Ores, in Chili.	Gold in Brazil.
	Devon.	Ireland.	Cuba.			
Labour	0·4588	——	——	——	——	0·2950
Materials, &c.	0·1345	——	——	——	——	0·3460
Working Costs	0·5933	0·6115	0·7866	0·6675	0·4239	0·6410
Dues & Duties	0·0782	0·0389	——	——	——	0·1026
Total Expenditure	0·6715	0·6504	0·7866	0·6675	0·4239	0·7436
Profits	0·3285	0·3496	0·2134	0·3325	0·5761	0·2564
Total proceeds	1·	1·	1·	1·	1·	1·

Henwood, *Cornwall Geol*: *Trans*: viii., pp. 208, 289, 440-442, 458-459, 601. *Tables*, v., vii., ix., xiv.

The Government of Russia receives from the washers *(Streamers)* of Imperial gold-sands in Siberia the undermentioned (Rents and *Dues)* Royalties.

Annual produce. Russian *poods*.	Royalties reserved.	Tracts wrought in 1851; classed according to produce.
Less than 1	300 silver *roubles* (£48)	77
Between 1 and 2	5 per cent. of the entire produce	29
,, 2 and 5	10 ,, ,,	37
,, 5 and 10	15 ,, ,,	16
,, 10 and 15	17 ,, on 10 *poods* .... / 25 ,, on all the rest..	6
,, 15 and 20	20? ,, on 15 *poods* .... / 28 ,, on all the rest..	2
,, 20 and 25	23 ,, on 20 *poods* .... / 30 ,, on all the rest..	3
,, 25 and 30	25 ,, on 25 *poods* .... / 32 ,, on all the rest..	51
,, 30 and 40	28 ,, on 30 *poods* .... / 33 ,, on all the rest..	51
,, 40 and 50	30 ,, on 40 *poods* .... / 34 ,, on all the rest..	3
More than 50	32 ,, on 50 *poods* .... / 35 ,, on all the rest..	2

The Russian *pood* is 43·878 lbs. *Troy*.

Ulauvaly, *Annales des Mines*, 5me Série, iii., pp. 821-830.

Regarding early copper-mining in Cornwall, it may not—even now—be too late to recover additional information; for, during the past year, I have been favoured by a friend* with original records of the qualities and prices of copper-ores sold in this County at periods earlier than those mentioned by either Borlase or Pryce. Of this remarkable document I hope to supply some account hereafter.

On the Pary's mountain in Anglesea† at *Dolfrwynog* and *Cae Mawr* in Merioneth,‡ and near Glandore in Cork,§ beds of peat are largely charged with metallic copper; nothing of the kind, however, has yet been discovered in Cornwall.

As the *water-charge* is always a heavy item of expenditure in mines, ingenuity ever has been, and still is, exercised to diminish it. The *adit*, the windlass, the hand-, and the *rag and chain-pump*, the *whim* and the water-wheel, were all adopted in turn.‖ At length, however, mines were deepened beyond the power of men and of horses to drain them and opened where water was unavailable; the only resource of the miner, therefore, was the steam-engine.¶

The earlier (atmospheric) steam-engines on the mines of Cornwall have been minutely described;** but of the numbers set up,††

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* Mr. Henry Williams, of Alma, near Truro.

† Pennant, *Tour in Wales*, iii., p. 61.

‡ Henwood, *Reports of the Royal Institution of Cornwall*, xxxviii., p. 41. Ramsay, *Memoirs of the Geological Survey of Great Britain*, iii., p. 45.

§ Weaver, *Geol: Trans:* v., N.S., p. 27.

‖ Carew, *Survey of Cornwall*, f. 11. Pryce, *Mineral: Cornub*: pp. 145-152. De la Beche, *Report*, p. 547. Combes, *Annales des Mines*, 3me. Série, v., p. 363.

¶ Borlase, *Natural History*, pp. 170-174. Pryce, *Mineral: Cornub:* pp. 153-160, 307-313.

** Borlase, *Natural History*, pp. 172-174. Pryce, *Mineral: Cornub:* 153-160. Farey, *Steam-Engine*, 190-204.

"The present fire-engine is now of about seventy years' standing." Pryce, *Mineral: Cornub*: (1778), p. 153.

"The first steam-engine in Cornwall was erected on Huel Vor, a tin mine in Breage, which was at work from 1710 to 1714." Carne, *Cornwall Geol: Trans*: iii., (1827), p. 50.

"It could not have been many years after 1720, that the first engine was erected in Cornwall, at Huel Rose, seven or eight miles from Truro." Redding, *Yesterday and To-day*, i., p. 128.

†† Nineteen engines have been particularized;—viz—

At *Ludgvan-lez*..	one of 47 inches cylinder.	*Pitt-louarn*?	two.
„ *Herland*	one „ 70 „ „	*Polgooth*	one.
„ *Chacewater*	one „ 62 „ „	*Godolphin*.....	one.
	one „ 64 „ „	*Bullen-garden*	one.
	one „ 72 „ „	*Dolcoath*	one.
„ *North Downs*.	two „ —	*Poldice*	two.
„ *Pool*	one „ 36 „ „	*Bosproual*.....	one.
„ *Wheal Rose* ..	one „ — „ „	*Wheal Virgin*.....	one.

and of their performance the details are few. It seems, however, that they were rarely loaded more than eight pounds on the inch,* —that the pressure of steam in the boiler seldom exceeded one pound above the atmosphere,†—that,—although some were worked fifteen or sixteen‡—the two best averaged about six strokes per minute,§—and that the *duty* of these, during August and September 1778, averaged (7,037,800 lbs. lifted one foot by—84 lbs. —a bushel) 9,383,733 per hundred weight (112 lbs.) of coal.§ In this experiment 14,080 bushels of coal were expended; in 1792, however, the same mine *(Poldice)* was drained thirty-two fathoms deeper by one of Boulton and Watt's engines, which consumed in a corresponding period 8,824 bushels only, and performed a *duty* of 26,708,515 per (84 lbs.) bushel, or 35,611,340 per cwt.||

The first of Boulton and Watt's engines erected in Cornwall was on the *Chacewater* mine in 1777;¶ three others were in course of erection during 1778;** fourteen were at work in 1780;†† twenty-one had been already set up in 1782, when one of New-

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Borlase, *Nat*: *Hist*: pp. 173-175. Pryce, *Mineral*: *Cornub*: p. 154. Farey, *Steam Engine*, p 190. Gilbert, *Phil*: *Trans*: cxx., p. 122. Redding, *Yesterday and To-day*, i., pp. 128-136.

"Thirty-six years ago, this county had only one fire engine in it; since which time above three score have been erected.

Pryce, *Mineral*: *Cornub*: (1778), xiv.

* *Ibid*, pp. 155, 159.

† Borlase, *Natural History*, p. 172. Pryce, *Mineral: Cornub:* p. 156. Farey, *Steam-Engine*, p. 202.

‡ Borlase, *Natural History*, p. 173. Pryce, *Mineral: Cornub:* pp. 155, 159.

§ Wilson, *Comparative Statement*, p. 8. Gilbert, *Phil: Trans:* cxx., p. 124.

It is remarkable that Messrs. Watt, Boulton, Tremayne, Williams, Williams, and Brown, the Reporters, mention neither the force of steam employed, nor even the dimensions of the engines.

|| Wilson. *A comparative statement of the effects of Messrs. Boulton and Watt's Steam-Engines with Newcommen's and Mr. Hornblower's* (Truro, 1792), p. 8.

¶ Pryce, *Mineral: Cornub:* p. 313. Smiles, *Lives of Boulton and Watt*, pp. 230, 235.

There still existed, in my youth, a tradition of the clamour which arose when—from inaccuracy of balance—the engine stopped on completing its first *(indoor)* down-stroke; the, scarcely evitable, defect, was, however, rectified in a few minutes.

** "At *Ting-Tang*, *Owanvean*, and *Tregurtha Downs*." Pryce, *Mineral: Cornub:* p. 313. Smiles, *Lives of Boulton and Watt*, pp. 224, 230, 242, 244.

†† Smiles, *Lives of Boulton and Watt*, p. 275.

comen's (atmospheric) engines only remained in the County;* and in 1790 this had disappeared.†

The *dues* payable to the patentees on engines actually at work amounted in 1782 to	£4,320
The *dues* to which the patentees would become entitled on engines in course of erection, would realize in 1782	9,000
The *dues* payable to the patentees on engines already erected, would realize in 1784	12,000

a year.‡ Particulars of the performance during fourteen experiments on nine engines erected in Cornwall, by Boulton and Watt between 1783 and 1792—ranging from 10·1 to 13·3 (per bushel or from 13·4 to 41·7 per cwt.)—averaged 22·5 per bushel, or 30· per cwt. of coal expended.§ In 1793 seventeen engines, which had been set up by Boulton and Watt, performed an average *duty* of lifting one foot 19·5 millions per bushel, or 26· per hundred weight of coal consumed.‖ In 1798, however, the performance of twenty-three engines ranged from 6· to 29·6, and

* Smiles, *Lives of Boulton and Watt*, p. 327.

† Farey, *Steam-Engine*, p. 383. Pole, *Cornish Pumping Engine*, p. 21.

‡ Smiles, *Lives of Boulton and Watt*, pp. 317, 393.

§ Mine.	Year.	Duration of Experiment.	Diameter of Cylinder.	Duty per 84 lbs. bushel.	Duty per cwt.
Wheal Virgin, E.	1783	——	——	22,930,414	30,573,885
Poldice, E.	,,	——	——	21,304,762	28,406,349
,,	1784	——	——	21,630,795	28,841,060
,,	1786	——	——	21,652,429	28,869,905
,,	1792	4 Months.	——	26,737,339	35,649,785
Dolcoath	1784	——	——	22,646,554	30,195,405
,,	1785	——	——	22,396,891	29,862,571
Tresavean	,,	28 Days.	28 inch.	20,304,265	27,072,358
Polgooth	1785-1786	2 Months.	——	29,225,750	38,967,666
Ale and Cakes	1786	1 Month.	——	31,338,850	41,785,133
Wheal Maid	1789	——	63 inch. double.	26,116,034	34,821,378
,,	1790	——	,,	25,231,695	33,642,260
Wheal Jewell	1791	3 Days.	20 inch. rotatory	10,102,269	13,469,692
Seal Hole	,,	——	20 inch.	13,938,986	18,585,314

Wilson. *A comparative statement of the effects of Messrs. Boulton and Watt's Steam-Engines, with Newcommen's and Mr. Hornblower's*, (Truro, W. Harry,) 1792.

For a sight of this rare and interesting pamphlet I am obliged to Mr. F. W. Michell, C.E., of Trewirgie, near Redruth; and for the register of the author's burial at Falmouth, on the 4th of July, 1820, at the age of 72, I am indebted to Mr. Alfred Fox, of Glen Durgan, near Falmouth.

‖ Gilbert, *Phil: Trans*: cxx., p. 125.

averaged 17·6* millions per bushel, or between 8·1 and 39·5 per hundred weight of coal used.

Boulton and Watt did not obtain the lead in Cornwall without strenuous opposition from resident engineers and proprietors of mines.† In course of the numerous contests in which they

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* "In May, 1798, returns were made by the agents in various mines, of all the particulars respecting twenty-three engines, from which I then deduced their respective duties."

Engines; Single or double.	Diameter of Cylinder; inches.	Duty— Per (84 lbs.) bushel of Coal.	Duty— Per cwt. of Coal.	Observations.
1 Single ...	20·	10,015,000	13,353,333	
2 ,, ...	21·	16,385,000	21,846,666	
3 ,, ...	45·	29,668,000	39,557,333	It was believed that the returns respecting these engines must have been inaccurate.
4 ,, ...	36·	28,212,000	37,616,000	
5 Double...	42·	18,193,000	24,257,333	On the same mine.
6 Single ...	63·	15,190,000	20,253,333	
7 Double...	45·	15,180.000	20,240,000	
8 Single ...	45·	15,571,000	20,761,333	
9 ,, ...	45·	15,090,000	20,120,000	
10 ,, ...	45·	14,384,000	19,178,666	
11 Double...	42·	18,740,000	24,986,666	
12 Single ...	42·	15,532,000	20,719,333	
13 ,, ...	36·	18,465,000	24,620,000	
14 ,, ...	—	12,226,000	16,301,333	The diameter of the cylinder not returned.
15 ,, ...	30·	14,050,000	18,783,333	
16 ,, ...	20·	12,366,000	16,488,000	
17 Double...	14·75	6,097,000	8,129,333	
18 Single ...	30·	13,931,000	18,574,666	
19 ,, ...	28·	19,739,000	26,318,666	
20 ,, ...	36·	24,514,000	32,685.333	
21 ,, ...	21·	13,215,000	17,620,000	
22 ,, ...	20·	15,034,000	20.045,333	
23 ,, ...	48·	27,503,000	36,670,666	Supposed to be the best engine.
		17,671,000	23,561,333	General average in 1798.

Gilbert, *Ibid*, pp. 125-126.

"In 1798 an engine at Herland—found to be the best in the county,—was doing 27 millions."

Taylor, *Records of Mining*, i., p. 154; *Quarterly Mining Review*, ii., p. 39; *Annales des Mines*, 3me. Série, ii., p. 56.

† Gregory, *Mechanics*, ii., pp. 381-386. Farey, *Steam-Engine*, p. 389. Gilbert, *Phil: Trans*: cxx., p. 125. Taylor, *Records of Mining*, i., p. 154. Arago, *Life of James Watt*, p. 56. Pole, *Cornish Pumping Engine*, pp. 36-40. Smiles, *Lives of Boulton and Watt*, pp. 234, 239, 257, 259, 278-281, 296-298, 303-304, 320, 419-420.

were engaged, many most ingenious novelties were brought forward by all parties.* Bull's device, to place the steam-cylinder immediately over the engine-shaft, and to connect the pump-rod with the piston-rod, without intervention of a *(bob)* beam,† was adopted in several instances; and is not yet forgotten.‡ Hornblower§ the most dangerous—because he was the most indefatigable, the ablest, and the most strongly-supported—of their antagonists, obtained, in two cylinders, the same results only which they had already accomplished in a single cylinder; Boulton and Watt therefore claimed dues from all the mines|| on which Hornblower's engines had been set up. As the contest was so keen, there can be little doubt that the performances of the several machines were sharply scrutinized; yet the *duty* of but one—out of fourteen which had been erected—is on record; of this, however, we have separate accounts¶ from parties in the opposite interests;

One representing the *duty* to have been 14·8 millions per bushel [19·7 millions per cwt.] .... } of coal consumed.
The other representing the *duty* to have been 16·6 millions per bushel [22·1 millions per cwt.] .... } of coal consumed.

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* Gregory, *Mechanics*, ii., pp. 378-379, 381-388, *Pl.* xxx., *Fig.* 7, 8, 11, 12. Farey, *Steam-Engine*, pp. 384-393, 673. Pole, *Cornish Pumping Engine*, p. 37. Smiles, *Lives of Boulton and Watt*, pp. 298, 304, 306, 309, 334-335.

† Lean, *Historical Statement*, p. 8.

‡ "An engine on this construction has lately been erected at a mine at Creegbroaz, south of Chacewater....."

"The inverted construction has also been lately adopted.... at the Gravesend Water Works, and also in Belgium."

Pole, *Cornish Pumping Engine*, p. 37.

§ Jonathan Hornblower, who died at Penryn in 1815, was fourth son of Jonathan Hornblower, and grandson of Joseph Hornblower, a native of Bromsgrove or its vicinity, who—about 1725—visited Cornwall in order to set up (at *Wheal Rose* some seven or eight miles from Truro) the first of Newcomen's (atmospheric) steam-engines. Redding, *Yesterday and To-day*, i., pp. 128-136. Pole, *Cornish Pumping Engine*, pp. 28-29, 71.

|| List of Engines on Hornblower's construction... from the original in the hand-writing of Mr. Wilson (of Whitehall in Kenwyn) Messrs. Boulton and Watt's financial agent; viz—*Tincroft*, *Wheal Unity*, *Tresavean*, *Wheal Margaret*, *Wherry*, *Wheal Pool*, *Wheal Providence*, *Baldice*, (? Baldue), *Wheal Tregothnan*, *East Pell*, *Lostwithiel*, *Wheal Towan*. Pole, *Cornish Pumping Engine*, p. 39.

¶ Hornblower's engine at *Tincroft* had one cylinder of 27, the other of 21 inches diameter; the stroke, in the former was 8, in the latter 6 feet, and in the pump 5 feet 10 inches; it worked rather more than seven strokes per minute, consumed on an average 22 bushels of coal per day, and lifted a column of water said to have weighed 5,541 lbs.; thus performing a duty of 14·8 millions per bushel [or 19·7 millions per cwt.] of coal consumed. Farey, (Wilson), *Steam-Engine*, p. 387. (Abridged). According to Trevithick and Morcom [Manager of *Wheal Towan*] the same engine performed

but neither bears favourable comparison with the engines of Boulton and Watt.*

Until the latter part of the last century lifting-pumps *(bucket-lifts)* only were in use;† but, about 1796, they were replaced by forcing-pumps *(plunger-lifts)*,‡ in shallow parts § of the *United*, and several neighbouring, mines,‖ which were still superintended by Murdoch, the ingenious, able, prompt, and popular representative of Boulton and Watt in this County. Observations by different persons in various mines¶ show that the actual, bears to the calculated, discharge of water by the pumps, a mean proportion of 0·917 to 1.

At the expiration of their patent Boulton and Watt withdrew from Cornwall, and the Mining Companies gave their machinery in charge to former foremen of the patentees,—to resident Engineers who in some cases had acted independently of, and in other had transgressed the patent,—or to Mining-agents who had become acquainted with the principle and operation of the steam-

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in April 1792, a duty of 16·6 millions per bushel [or 22·1 millions per cwt.] of coal.

Wilson, *Comparative statement of the effects of Messrs. Boulton and Watt's Steam-Engine, with Newcommen's and Mr. Hornblower's*, pp. 12-15, 17-19.

(MS. of the late Davies Gilbert, Esq., D.C.L.; M.P.; P.R.S.) Pole, *Cornish Pumping Engine*, p. 37.

* *Ante*, pp. 41, 42, Notes.

† "A considerable improvement has [of late years] taken place in the "arrangement of the *pit-work*, for the purpose of raising a part of the water "by means of *plungers* or forcing pumps; before these were adopted all the "water was *drawn* from the mine by the up-stroke of the engine." Carne, *Cornwall Geol*: *Trans*: iii., p. 59.

‡ Taylor, *Records of Mining*, i., p. 134, *Pl.* xiii., xiv., *Fig.* 2; *Annales des Mines*, 3me Série, i., p. 218, *Pl.* iv. v., *Fig.* 2. Combes. *L'Exploitation des Mines*, iii., p. 359, *Pl.* liv., *Fig.* 1. *Pick and Gad*, i., p. 38, *Pl.* 2.

§ "Even should the water have risen [from accident] in the mine "almost to the very top of the *drawing-lift*, the bucket may be drawn out "and replaced with the greatest facility; this circumstance alone secures a "preference to this kind of pump for the deepest parts of shafts." Taylor, *Records of Mining*, i., p. 132.

‖ Lean, *Historical Statement*, p. 9. Henwood, *West Briton*, (23rd April, 1841) xxxi., No. 1,606. (Sampson and Michell, *Cornwall Geol*: *Trans*: viii., p. 570. Enys, *Tran*: *Inst*: *Civil Engineers*, iii., p. 463. Pole, *Cornish Pumping Engine*, p. 112.

¶ At *Wheal Towan*, by Rennie and Henwood in 1830, *Trans*: *Inst*: *Civil Engineers*, ii., p. 58.

At *Holmbush*, by Wicksteed in 1838, *Ibid*, ii., p. 62.

At the *United Mines*, by Enys in 1839, *Ibid*, iii., p. 457.

engine.* The patentees having been paid in proportion to the saving of fuel they effected, the strictest economy was practised by their representatives; on their retirement, however, this rigour was abated, the engine-men became less careful of their coal, and the *duty* of the engines declined.† For some time, indeed—

The average did not exceed 14 millions per bushel, or 18·6 millions per cwt. } of coal consumed,
And in rare instances a duty of 6 millions per bushel, or 8·0 millions per cwt. } of coal consumed,

only, was accomplished. The waggon *(hearse)* boilers, then in use, would have been unsafe with steam of the force commonly employed now; and the fires—unlike those recommended by Smeaton at *Chacewater*‡—were several feet thick.§ Boulton and Watt had, indeed, worked their engines expansively, but Watt himself—aware, possibly, of the inadequacy of his boilers—had refrained from using steam of high tension.‖ Nor, in fact, was the pressure, prevalent throughout the County very materially increased during several subsequent years; for engines set up at the *United-mines*¶ by Hornblower, about 1811-1812, were worked in 1821 by steam which, in the boiler, was balanced by a column of water some twenty-two feet in height.**

The works of *Dolcoath*, which had been suspended in 1788, were resumed in 1800,†† when Trevithick was appointed the (mechanical) engineer. From that—if not from an earlier—period he conducted the experiments, and devised the various forms of construction, which, in 1811,‡‡ eventuated in the cylin-

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* Henwood, *Edin*: *Journal of Science*, x., p. 34. Taylor, *Records of Mining*, i., p. 154. Lean, *Historical Statement*, p. 8. Pole, *Cornish Pumping Engine*, p. 43.

† Carne, *Cornwall Geol*: *Trans*: iii., p. 58. Henwood, *Edin*: *Journal of Science*, x., p. 34. Lean, *Historical Statement*, p. 8. Pole, *Cornish Pumping Engine*, p. 43.

‡ Farey, *Steam-Engine*, p. 191.

§ Héron de Villefosse, *de la Richesse Minérale*, i., p. 293. Henwood, *Edin*: *Journal of Science*, x., p. 35. Pole, *Cornish Pumping Engine*, 59.

‖ The late Mr. William Wilson (son of Boulton and Watt's financial agent in Cornwall) was present when—some one mentioning the high tension at which Trevithick worked his engines—Mr. Watt remarked "I could have my engines worked to one hundred pounds on the inch; but I—[would not]—be the engine-man."

¶ Lean, *Historical Statement*, pp. 28, 53.

** Farey, *Phil*: *Mag*: *and Annals*, viii., p. 309.

†† Rule, *Cornwall Geol*: *Trans*: viii., p. 146. Thomas, (C.), *Ibid*, p. 447.

‡‡ Mr. Francis Trevithick, MS. (Extracted from his Father's papers). Phillips and Darlington, *Records of Mining and Metallurgy*, p. 87.

drical tubular boiler;* a kind of boiler which—having superseded boilers of all other kinds—long has been, and still is, exclusively used in Cornwall. Of this improvement it is scarcely possible to exaggerate the importance.†

In 1801-2 Trevithick constructed, for driving a saw-mill‡ at Marazion, a high-pressure engine of small size which was worked by steam of at least thirty pounds on the inch above atmospheric pressure.§ In 1806 he erected a larger engine, of the same kind, "for drawing" "ores at *Dolcoath*,"|| and worked it with steam of "*nearly forty pounds to the inch.*"¶ In 1815 he supplied *Herland* with a pumping-engine of thirty three inches *pole*** on the like principle, and worked it with steam of one hundred and thirty pounds on the inch.†† High-pressure *(non-condensing)*—engines, however, found no favour in this County; and many years have elapsed since the last of them ceased to work.

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* Taylor, *Phil*: *Mag*: *and Annals*, i., pp. 127-128, *Fig.* 1. Henwood, *Edin*: *Journal of Science*, ix., p. 159, *Pl.* ii., *Fig.* 12. Farey, *Phil*: *Mag*: *and Annals*, viii., p. 313, Note. Combes, *Annales des Mines*, 3me. Série, v., pp. 367-369; *L'Exploitation des Mines*, iii., p. 683, *Pl.* lxiii., *Fig.* 3. Pole, *Cornish Pumping Engine*, p. 60. *The Engineer*, xxxi., (5th May, 1871) p. 297.

† "It has been found.... that the fuel goes further in [these boilers] than in any others yet tried."

Taylor, *Phil*: *Mag*: *and Annals*, i., p. 128.

"To Captain Trevithick is due the form [of boiler] which is now "generally adopted, and from which doubtless considerable advantage has "arisen." Taylor, *Records of Mining*, i., p. 155.

"Better boilers.... for high pressure steam.... were first brought into "use by Mr. Trevithick in 1804." Farey, *Phil: Mag*: *and Annals*, viii., p. 313.

"It is impossible to over-estimate the benefit conferred by the late Mr. "Trevithick on the mines of this county. The cylindrical boiler effected a "saving of at least one-third in the quantity of coal previously required. I "remember that in 1812 our house at Scorrier paid [him] £300, as an ac-"knowledgement of the benefits received by us in our mines from this source 'alone."

Williams (Michael); Edmonds, *Land's-End District*, p. 255.

Phillips and Darlington, *Records of Mining and Metallurgy*, p. 87.

‡ This machine, in which circular saws only were worked, was—within my recollection—removed to Perran Wharf.

§ Henwood, *Phil*: *Mag*: *and Annals*, x., p. 97.

|| Pole, *Cornish Pumping Engine*, p. 45.

¶ Mr. Trevithick's letter, of 18th February, 1806, to Mr. Davies Gilbert. Pole, *Cornish Pumping Engine*, p. 162.

** "Instead of a piston working in the main cylinder of the steam-"engine, I use a *plunger-pole*, similar to those employed in pumps for lifting "water, and I make the said *plunger-pole* nearly of the same diameter as "the working-cylinder." Trevithick, *Patent* 6th June, 1815. Pole, *Cornish Pumping Engine*, p. 57.

†† Mr. Francis Trevithick, MS. (Extracted from his father's papers.)

From the period of his experiments with steam of great tension, in the high-pressure winding-engine at *Dolcoath*, in 1806, Trevithick sought to use highly-elastic steam in Watt's condensing engine;* but no opportunity for doing so offered until 1811-1812. At that time, however, he erected at *Wheal Prosper* (Gwithian) an ordinary single-acting condensing-engine of twenty five inches cylinder, furnished with his cylindrical, tubular-boiler, in which he worked steam of more than forty pounds on the inch; expanding it,—when the engine was set up—fully seven-eighths of the working-stroke.†

At *Dolcoath* a single-acting condensing-engine,—which had been worked by Trevithick in 1800,—performed in February 1814, when Jeffery and Gribble had become the superintendents, the then unexampled *duty* of 35, millions per bushel,‡ or—if as of late the bushel be taken to weigh 94 lbs.§—41·7 millions per hundred weight, of coal.

Woolf, who had been already engaged by Trevithick as an engine-fitter in Cornwall, was—about 1802—sent, by his employer, in the same capacity, to London; where—towards the latter part of 1803‖—he established himself on his own account as an Engineer. About the same time he propounded—as established "by actual experiment,"—a theory utterly at variance with the laws long previously known to govern the dilatation of all

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* Letter of 18th February, 1806, to Davies Gilbert, Esq. Pole, *Cornish Pumping Engine*, pp. 162-163.

† Henwood, *Phil: Mag: and Annals*, x., p. 98. Pole, *Cornish Pumping Engine*, pp. 51-52.

‡ Lean, *Historical Statement*, pp. 20, 31.

§ During experiments made in 1831 all the coal used was both weighed and measured, and portions from every bushel were afterwards dried by the means of a water-bath. The weights when delivered at the boiler-house, and after having been dried were at

Wheal Towan,	at the boiler-house	100 lbs.,	when dried	93·8 lbs.	per bushel.
Binner Downs,	,,	92·6 ,,	,,	83·4 ,,	,,
East Crennis,	,,	88·3 ,,	,,	84·1 ,,	,,
Mean	,,	93·6 ,,	,,	87·1 ,,	,,

Henwood, *Trans: Inst: Civil Engineers*, ii., p. 58.

In 1835 a bushel of coal was weighed at the *Fowey Consolidated Mines* and found to be 94 lbs.

Lean, *Historical Statement*, p. 99.

"I saw 94 lbs. (a Cornish bushel) of coals weighed."

Wicksteed, *Trans: Inst: Civil Engineers*, ii., p. 61.

‖ Trevithick's account-books (which still exist) show, that in 1803, Woolf was paid at the rate of Thirty Pounds a year only.

elastic fluids;* but—in spite of industrious publication by deluded partizans—it never found credit with either philosophers or practical men. During a few ensuing years he erected several small steam-engines;† but—in some cases at least—their performance was not entirely satisfactory.‡ About 1812§-1813,‖ however, he returned to Cornwall,¶ and shortly afterwards he was appointed to *Wheal Abraham*,** *Wheal Vor*,†† and *Wheal Unity*, at all which he erected (Hornblower's) engines with two cylinders. The first of two engines set up at *Wheal Abraham* maintained, for some years, a very high—frequently, indeed the highest—place in

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* "Mr. Woolf has found, *by actual experiment*, setting out from the "boiling point of water, or 212°, at which degree steam of water is only "equal to the pressure of the atmosphere, that in order to give it an in- "creased elastic force equal to five pounds the square inch, the temperature "must be raised to about 227½°, *when it will have acquired a power to ex- "pand itself to five times its volume, still be equal in pressure to the atmos- "phere*, and capable of being applied as such to the working of steam- "engines, . . . and with regard to various other pressures, temperatures, "and expansive forces of steam . . . as in the following table,"—

Steam of an elastic force predominating over the pressure of the atmosphere upon a safety valve	Pounds per square inch.	requires to be maintained by a temperature equal to about	Degrees of heat.	and at these respective degrees of heat, steam can expand itself to about	Expansibility.	times its volume, and continue equal in elasticity to the pressure of the atmosphere.
	5		227½		5	
	6		230¼		6	
	7		232¾		7	
	8		235½		8	
	9		237½		9	
	10		239½		10	
	15		250½		15	
	20		259½		20	
	25		267		25	
	30		273		30	
	35		278		35	
	40		282		40	

Gregory, *Mechanics*, ii., pp. 395-396. Rees, *Cyclopædia*, xxiv., Article, *Steam-Engine*.

† Rees, *Cyclopædia*, xxiv., Article, *Steam-Engine*, (N). Farey, *Phil: Mag: and Annals*, viii., p. 308.

‡ "I have been favoured by Mr. George Rennie with some notes of "trials made by his father in 1807 upon Woolf's engines at Meux's Brewery "and at Reid's Distillery, whereby they appear to have been doing much less "duty than Watt's engines of the same period." Pole, *Cornish Pumping-Engine*, p. 55.

§ Henwood, *Edin: Journal of Science*, x., p. 351.

‖ Farey, *Phil: Mag: and Annals*, viii., p. 308. Pole, *Cornish Pumping-Engine*, p. 55.

¶ Not in 1810. Taylor, *Records of Mining*, i., p. 155.

** Lean, *Historical Statement*, p. 15.

†† *Ibid*, p. 31.

the *Engine Reports;** but the others scarcely surpassed ordinary single-acting engines, made at the same time. Hornblower's combined-cylinders were last worked in Cornwall by Woolf, at *Wheal Alfred*, about 1824;† but their performance was surpassed by that of an ordinary single-engine on the same mine.‡ The engines at *Wheal Abraham*, *Wheal Vor*, and *Wheal Unity*, were supplied with the tubular cast-iron boilers, for which Woolf had taken out a patent;§ but—from unequal expansion—both their joints and tubes were so frequently broken, that they were advantageously replaced by the cylindrical boilers of Trevithick.‖ We owe to Woolf's experience in London the high finish,¶ and the careful working,¶ of our engines; but whether their proportions have been improved since Watt's time may, possibly, be questioned.

Before Trevithick left England for Peru,** in 1816, he either sold†† his patent *(non-condensing)* high-pressure engine or granted a licence for using it; and Sims‡‡—whose practice exceeded that of any other engineer in Cornwall—forthwith united it with the ordinary single *(condensing)* engine, admitting steam from the boiler beneath the *pole* of the former, and thence expanding it above the piston—in the larger and longer cylinder—of the

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* *Lean*, pp. 31, 32. Taylor, *Records of Mining*, l., pp. 156, 157. *Quarterly Mining Review*, ii., pp. 41, 42. *Annales des Mines*, 3me Série, ii., pp. 59, 60.

† Henwood, *Edin: Journal of Science*, x., p. 37. Farey, *Phil: Mag: and Annals*, viii., p. 312.

This engine is figured in *the Engineer*, (6th May, 1870), xxx., p. 277; (3rd March, 1871), xxxi., p. 139.

‡ Farey, *Phil: Mag: and Annals*, viii., p. 312. Henwood, *Ibid*, x., p. 100. Lean, *Historical Statement*, pp. 63, 64. Husband, *Proceedings of the Institution of Civil Engineers*, xxiii., p. 77.

Notwithstanding Mr. Taylor was principal agent of *Wheal Alfred* at the time, his memoir, *on the Duty of Steam-Engines (Records of Mining*, i., pp. 149-165) makes no mention of this circumstance.

§ Gregory, *Mechanics*, ii., p. 403. Rees, *Cyclopœdia*, xxxiv., (N.), *Pl.* v., *Figg.* 4, 5. Phillips and Darlington, *Records of Mining and Metallurgy*, p. 87. *The Engineer*, (6th May, 1870), xxx., p. 277.

‖ Henwood, *Edin: Journal of Science*, x., p. 36. Pole, *Cornish Pumping Engine*, p. 61.

¶ Henwood, *Edin: Journal of Science*, x., p. 36. Pole, *Cornish Pumping Engine*, p. 56.

** Boase, *Cornwall Geol: Trans*: i., p. 217,

†† Pole, *Cornish Pumping Engine*, p. 58.

‡‡ William Sims was born at or near Chacewater on the 29th of December, 1762, and died at Whitehall, in Kenwyn, on the 16th of October, 1834.

To the courtesy of this intelligent and excellent gentleman, I owe much information, which it might now be impossible to obtain, regarding the early application of steam-power in Cornwall.

latter;* thus reversing the mode of application previously adopted in combined-cylinders by Woolf and his predecessor Hornblower. Notwithstanding an engine on this construction at *Treskerby* sometimes took the first place on the *Report*,† scarcely half a dozen of the kind were erected.‡ Sims, however, was always averse to the use of very highly-elastic steam.§

About the same time Jeffree and Gribble—with the advantage of advice from Sims‖—erected, at *Dolcoath*, the largest single-acting engine, until then, seen in Cornwall;¶ which—like that set up some years before at *Wheal Prosper***—was worked with steam of moderately high pressure in Trevithick's cylindrical boilers;†† and it immediately performed, and for several years continued to perform, exceedingly high duty.‡‡

In 1820 a seventy-inch, and two ninety-inch single-acting engines were placed, by Woolf, on the *Consolidated Mines*;§§ all which were supplied with Trevithick's boilers, but the fires within them were much shallower than those previously used in the neighbourhood; their performance, however, never equalled that of the engine at *Dolcoath*.

Watt's first patent‖‖ provided that all vessels containing dense steam should be enveloped with non-conductors of heat; a precaution which was, probably—to a greater or less degree—observed at the erection of every engine. For many years, however, the coverings of the cylinders, steam-pipes, and boilers were as much neglected as the fittings of the stuffing-boxes and joints; and—for want of the special arrangements which are now pretty general—the wet working-dresses of the miners were dried on the

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* Henwood, *Edin: Journal of Science*, x., p. 37. Pole, *Cornish Pumping Engine*, p. 58.

† Lean, *Historical Statement*, p. 48.

‡ Henwood, *Edin*: *Journal of Science*, x., p. 37. Pole, *Cornish Pumping Engine*, p. 58.

§ Pole, *Cornish Pumping Engine*, p. 58.

‖ This statement is made on the authority of the late Mr. Sims himself.

¶ Henwood, *Edin*: *Journal of Science*, x., p. 45. Taylor, *Records of Mining*, i., p. 156. Farey, *Phil: Mag: and Annals*, viii., p. 312. Pole, *Cornish Pumping Engine*, p. 56.

** *Ante*, p. 47.

†† Pole, *Cornish Pumping Engine*, p. 61.

‡‡ Henwood, *Edin*: *Journal of Science*, x., p. 45. Taylor, *Records of Mining*, i., pp. 156-158. Lean, *Historical Statement*, pp. 32, 42, 56.

§§ Henwood, *Edin*: *Journal of Science*, x., p. 37. Taylor, *Records of Mining*, i., p. 157. Farey, *Phil: Mag: and Annals*, viii., p. 312. Lean, *Historical Statement*, p. 33. Pole, *Cornish Pumping Engine*, p. 57. Smyth, *Coal and Coal-Mining*, p. 187. Taylor, Farey, and Pole mention only the two last, Lean speaks of but one, of these engines.

‖‖ In 1769. Farey, *Steam-Engine*, p. 316.

naked or imperfectly protected vessels,* in and through which dense steam was generated, conveyed, and worked. At length the emulation excited by the *Engine-Reports* compelled attention to the prejudicial influence of this exposure; and the use of non-conducting substances was resumed, with corresponding benefit; yet without suspicion of the extent to which they could be advantageously applied. In 1825, Grose†—one of Trevithick's pupils—commenced at *Wheal Hope*‡ in Gwinear, the system of protection from which he,—and others subsequently—realized most important results. The *duty* performed there, by an engine of sixty inches cylinder, having averaged—

In 1825	40·8§	millions per bushel;	59·2	millions per cwt.
,, 1826	45·4	,, ,,	54·6	,, ,,
,, 1827	47·3	,, ,,	56·4	,, ,,
,, 1828	70·5‖	,, ,,	84·	,, ,,

The improvements thus begun were yet more effectually carried out, by the same engineer, on an engine of eighty inches cylinder erected at *Wheal Towan*¶ in the latter part of 1826. At first, when protected, in the ordinary manner, with two, three, or four inches of ashes and saw-dust,—it realized nearly 50 millions** per bushel (59·5 per cwt); afterwards, however, the protection was increased from four to ten, and again from ten to twenty inches in thickness, and at each increase the duty proportionally improved.†† An engine of ninety inches cylinder, which had been

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* Head, *Quarterly Review*, xxxvi., p. 89. *Report of Commissioners appointed to inquire into the condition of Mines in Great Britain*, p. xxii; *Epitome of Evidence*, pp. 91-94.

† Samuel Grose was born (of Cornish parents) at Nether Stowey, in Somersetshire, 15th of March, 1791, and died at Wall, in Gwinear, 12th June, 1866.

‡ Taylor, *Records of Mining*, i., p. 158; *Annales des Mines*, 3me Série, ii., p. 63. Farey, *Phil: Mag: and Annals*, viii., p. 313. Henwood, *Ibid*, x., p. 100. Lean, *Historical Statement*, p. 57. Pole, *Cornish Pumping Engine*, p. 63.

§ Henwood, *Edin: Journal of Science*, x., p. 48.

‖ Lean, *Historical Statement*, p. 78.

¶ "A remarkable improvement in the duty of steam-engines has of late "taken place in two instances on mines in Cornwall.... The first engine in "which this improvement appeared was one erected at Wheal Hope, of "60-inch cylinder, working single as usual.... [An] engine afterwards built "by Captain Grose.... [has exceeded] by nearly 50 per cent. what had "hitherto been attained.... This great improvement is in progress of being "applied to other large engines in the same district." *Phil: Mag: and Annals*, ii., p. 309.

The Engineer (6th May, 1870), xxx., p. 277.

** *Observations on the performance of a Steam-Engine at Wheal Towan*, by W. J. Henwood, *Truro*, Brokenshir, 1828. *Edin: Journal of Science*, ix., p. 159. Herschel, *Natural Philosophy*, (Cabinet Cyclopædia), p. 59. Taylor, *Records of Mining*, i., p. 158; *Annales des Mines*, 3me Série, ii., p. 63. Lean, *Historical Statement*, p. 57. Pole, *Cornish Pumping Engine*, p. 63.

†† Henwood, *Edin: Journal of Science*, x., p. 57.

set up by Woolf at *Wheal Alfred* in 1825—and had there performed from 30·8* to 41·9*† per bushel (36·7 to 51·1 per cwt.) —ceased to work there in 1826; was removed by him to the *Consolidated Mines* in 1827,‡ and—by adopting the means which had been already so successfully adopted at *Wheal Hope* and *Wheal Towan*§—attained, (during three months,) a higher duty than any other engine in Cornwall. The following columns show the performance of these excellent engines during the early progress‖ of protection by non-conductors of heat;—

Date.	WHEAL TOWAN. Wilson's Engine,—Grose Engineer.		CONSOLIDATED MINES. Wheal Fortune (Woolf's) Engine, Woolf Engineer.	
	Per (94 lb.) bushel.	Per hundred weight.	Per (94 lb.) bushel.	Per hundred weight.
1827—January . . .	48·9 millions	58·3 millions	——	——
,, February . .	51·8 ,,	61·7 ,,	——	——
,, March	53·5 ,,	63·7 ,,	——	——
,, April.	61·8 ,,	73·6 ,,	——	——
,, May	60·6 ,,	72·2 ,,	——	——
,, June	61·7 ,,	73·5 ,,	——	——
,, July	62·2 ,,	74·1 ,,	——	——
,, August	61·7 ,,	73·5 ,,	——	——
,, September.	60·1 ,,	71·6 ,,	——	——
,, October . . .	61·3 ,,	73· ,,	63·7 millions	75·9 millions
,, November .	56·1 ,,	66·8 ,,	67· ,,	79·8 ,,
,, December .	57·7 ,,	68·7 ,,	62·4 ,, ¶	74·4 ,,
1828—January . . .	64·4 ,,	76·7 ,,	59·2 ,,	70·5 ,,
,, February . .	73· ,,	87· ,,	62·9 ,,	75· ,,
,, March	84·2 ,,	100· ,,	62·3 ,,	74·2 ,,

* Henwood, *Edin: Journal of Science*, x., p. 48.

† Taylor, *Records of Mining*, i., p. 158. Lean, *Historical Statement*, p. 56. Farey states 42·6. *Phil: Mag: and Annals*, viii., p. 312.

‡ Carne, *Cornwall Geol: Trans:* iii., pp. 348, 351-353. Henwood, *Phil: Mag: and Annals*, vii., p. 324. Farey, *Ibid*, viii., p. 313. Taylor, *Records of Mining*, i., p. 158; *Quarterly Mining Review*, ii., p. 44; *Annales des Mines*, 3me Série, ii., p. 64.

This engine—probably by a merely clerical error—is represented as still at work on *Wheal Alfred* throughout 1828; whereas it had been already removed to the *Consolidated Mines*, and, in fact, its performance there was recorded, in 1827. Lean, *Historical Statement*, pp. 57, 58, 64, 69.

§ Farey, *Phil: Mag: and Annals*, viii., p. 813.

‖ *Phil: Mag: and Annals*, ii., p. 309. Henwood, *Edin: Journal of Science*, x., pp. 46, 48; *Phil: Mag: and Annals*, vii., pp. 101, 102. Taylor, *Records of Mining*, i., pp. 158, 159; *Quarterly Mining Review*, v., pp. 44, 46. *Annales des Mines*, 3me Série, ii., pp. 64, 65. Lean, *Historical Records*, pp. 57-62, 69, 87, 93-94.

¶ At this time an experiment conducted by Engineers, Captains, and *Pitmen* of other mines gave during twenty-six hours and a half an average *duty* of 63·6 millions per bushel (75·8 per cwt.) Henwood, *Edin: Journal of Science*, x., p. 101. Taylor, *Records of Mining*, i., p. 159. Lean, *Historical Statement*, pp. 58, 59. Pole, *Cornish Pumping Engine*, p. 64.

Date.	Wheal Towan.		Consolidated Mines.	
1828—April.....	87· millions.	103·7 millions	57·2 millions	68·1 millions
,, May	—— *	—— ,,	67·5 ,,	80·4 ,,
,, June.....	76·1 ,,	90·7 ,,	61·5 ,,	73·3 ,,
,, July	75·8 ,,	90·3 ,,	65·4 ,,	77·9 ,,
,, August	81·9 ,,	97·5 ,,	61·9 ,,	73·7 ,,
,, September.	81·6 ,,	97·2 ,,	62·8 ,,	74·8 ,,
,, October. ..	77·8 ,,	92·4 ,,	65·7 ,,	78·3 ,,
,, November.	74·2 ,,	88·4 ,,	60·8 ,,	72·4 ,,
,, December .	73·6 ,,	87·7 ,,	63· ,,	75·1 ,,

As the means employed by Grose, and the sharp competition which for a time prevailed between his engines and the engine which Woolf had removed from *Wheal Alfred* to the *Consolidated Mines*, formed a theme for keen discussion by all parties interested in mines; protective measures were generally adopted at once, and the average performance throughout the county immediately advanced,† in a manner unequalled in any similar interval of the sixty years during which the reports have been continued. For four years, however, the engine at *Wheal Towan* maintained the

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* A trial made at this period by several Engineers, Captains, *Pitmen* and others afforded for twenty-six hours a mean duty of 87·2 millions per bushel (103·9 per cwt.) of coal. Henwood, *Edin: Journal of Science*, x., p. 37; *Phil*: *Mag*: *and Annals*, x., p. 102. Taylor, *Ibid*, vii., p. 425. Lean, *Historical Statement*, pp. 59-61. Pole, *Cornish Pumping Engine*, p. 65.

During an experiment on the same engine by Mr. (now Sir John) Rennie and myself in April 1830 the *duty* by

Computation of the load, velocity, and consumption of fuel amounted to 92·6 millions per bushel or 109·9 per cwt. } of coal consumed.

Computation of the quantity of water delivered by the pumps amounted to 83·6 millions per bushel or 99·6 per cwt. } of coal consumed.

Phil: *Mag*: *and Annals*, x., p. 102; *Trans*: *Inst*: *Civil Engineers*, ii., p. 58. *Ante*, p. 44.

An earlier notice of this experiment was published, by Mr. Taylor, from notes furnished by me to Mr. R. J. Neville, then the principal adventurer in *Wheal Towan*. *Phil: Mag: and Annals*, vii., p. 425.

In 1831 this engine was tried for a third time, when the coal consumed was both measured and weighed.

The result obtained was 86·5 millions per bushel;—or
96·9 ,, per ton of coal.

Henwood, *Report of the British Association*, vi., Part ii., p. 129; *Trans: Inst: Civil Engineers*, ii., p. 58; *Edin: New Phil: Journal*, xxvii., p. 50.

"In one engine [at *Wheal Towan* the lecturer] had succeeded in raising "125·7 million lbs. of water one foot high with one bushel of coal.... The "average performance of the engine is from 70 to 80 millions," Galloway (Elijah) Lecture 21st February, 1833. *Proceedings of the Plymouth Institution*, 1813-1833, p. 65.

† Lean, *Historical Statement*, pp. 57, 59. *Postea*, pp. 58, 59.

first place;* but it ceased to perform, under ordinary circumstances,† the same *duty* it had performed in 1828.

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* Lean, *Historical Statement*, pp 61, 87, 93, 94.

† In 1831 experiments were made on the best of several engines in which various modes of economising the force of dense steam were adopted by different engineers. The engines selected for trial were—

East Crinnis of 76 inches cylinder, erected by Sims, which during the year had performed a duty of 64·6 millions;

Wheal Towan of 80 inches cylinder, erected by Grose, which during the year had performed a duty of 76·6 millions;

Binner Downs of 70 inches cylinder, erected by Thomas, which during the year had performed a duty of 52· millions;

The boilers, steam-pipes, steam-nozzles, and cylinders of all three were covered with at least sixteen inches in thickness of ashes or saw-dust; and this was, in fact, the only protection applied to any part of the engine at *East Crennis;* the cylinder together with its cover and bottom were enclosed in a case or jacket, which communicated with the boilers, at *Wheal Towan;* and flues, from small separate fires, passed beneath the steam-nozzle, over the cylinder cover, and wound spirally round the cylinder at *Binner Downs*. These are, perhaps the earliest, if, indeed, they are not the only, Cornish trials—save the one experiment made with a single bushel of coal (Wicksteed, *Trans: Inst: of Civil Engineers*, ii., pp. 61-64)—in which all the fuel consumed was both measured and weighed. At

East Crinnis..	34 bushels	weighed	3,005 lbs,	or	88·3 lbs.	per bushel measured from the heap.
Wheal Towan.	50 ,,	,,	5,003 ,,	,,	100· ,,	
Binner Downs	60 ,,	,,	5,561 ,,	,,	83·4 ,,	

The duty performed amounted at—

East Crinnis	to 73·9	millions	per bushel,	or 93·3	per cwt. of Coal;
Wheal Towan ..	,, 86·5	,,	,,	,, 96 9	,, ,,
Binner Downs ..	,, 73·8	,,	,,	,, 89·2	,, ,,

At *Wheal Towan* each bushel of coal evaporated 16·91; each cwt. 18·92 cubic feet of water.

Taking the coal, grease, and oil consumed at their market prices, the engine at

East Crinnis lifted	870 tons	one foot high at the expense of a farthing.
Wheal Towan ,, ...	1,085 ,,	
Binner Downs ,, ...	1,006 ,,	

During all these experiments diagrams were frequently taken with the *Indicator;* the pressure of the steam used, the temperature of the condensing-water and of the hot-well, together with many other particulars, were all frequently and carefully noted

Henwood, *Edin: Journal of Science*, x., p. 41. *Report of the Brit: Association*, vi., Part ii., p. 129; *Trans: Inst: Civil Engineers*, ii., pp. 49-60; *Pl.* iv., *Fig.* 4-11; *Edin: New Phil: Journal*, xxvii., pp 42-52; *Reports of the Royal Institution of Cornwall*, xx., p. 20. Parkes, *Trans: Inst: Civil Engineers*, iii., pp. 257-294, *Pl.* ix., x. Combes, *L'Exploitation des Mines*, iii., pp. 542, 562, *Pl.* lxii, *Fig.* 4, 5.

"Mr. Henwood's . . . . . series of Indicator diagrams . . . . . are the earliest on record." Enys, *Trans: Inst: Civil Engineers*, iii., p. 455.

From this time forward the bushel of Welsh coal has been taken to weigh 94 lbs.

Enys, *Reports of the Royal Corn: Pol: Society*, v., p. 72. Wicksteed, *Trans: Inst: Civil: Engineers*, ii., p. 61. Lean, *Historical Statement*, pp. 99, 135-138, 140. Husband, *Proceedings of the Inst: Civil Engineers*, xxiii., p. 79.

An engine of eighty inches cylinder, erected by Richards, at *Wheal Vor*,* now took the lead; by lifting,

In 1832—91·4 millions per bushel,† or 108·9 millions per cwt. of coal, and
,, 1833—85·3 ,, ,, ‡ ,, 101·6 ,, ,, ,,

In 1834,§ West erected, at the *Fowey Consolidated Mines*, an engine of the same dimensions, in which he embodied all previous improvements,—modifying them by the results of his experience during several years as an assistant to Grose,—at *Wheal Towan*. During

this year it realized a duty of 97·8 millions‖ per bushel, or 116·5 per cwt.
and in 1835 ,, ,, 95·7 ,, ¶ ,, ,, 114· ,,

In 1836, however, an engine of similar dimensions set up by Eustis at *Wheal Darlington* attained the first place; having performed 95·4 millions** per bushel, or 113·7 per cwt. of coal. In 1837†† the engine at the *Fowey Consolidated Mines* regained its

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* The dimensions of this engine, and a diagram taken by an *Indicator* placed on it, are given by Henwood. *Trans: Inst: Civil Engineers*, ii., pp. 54-55, *Pl.* iv., *Fig.* 11.

† Lean, *Historical Statement*, p. 95.

‡ *Ibid*, p. 96.

§ In 1834 a detailed description of a Cornish Pumping-Engine in its present form was first published by Combes; with illustrations by Hocking, who had designed it for the *Consolidated Mines*. *Annales des Mines*, 3me Série, v., pp. 367-370, 593-608, 616-621, *Pl.* xi., *Fig.* 1-7.

‖ It has been represented that during a trial, superintended by the Pursers, other Accountants, Captains, and *Pitmen* of various mines, this engine performed a duty of 125·1 millions per bushel, or 142·5 per cwt. of coal. A single bushel of the coal they used was found to weigh 94 lbs. Lean, *Historical Statement*, pp. 97-101. Parkes, *Trans: Inst: of Civil Engineers*, iii., pp. 62-63. Pole, *Cornish Pumping Engine*, pp. 66, 67. Smyth, *Coal and Coal-Mining*, p. 187.

It has been inaccurately stated that this duty was maintained during an entire month. Beardmore, *Proceedings of the Inst: of Civil Engineers*, xxiii., p. 83.

The dimensions of this engine, and various details relating to it, have been published by Wicksteed. *Experimental enquiry concerning the Cornish and Boulton and Watt Pumping Engines*, p. 25. Combes, *L'Exploitation des Mines*, iii., pp. 677-678.

¶ Lean, *Historical Statement*, p. 113.

** *Ibid*, p. 133.

At Loam's engine on the *United Mines* during the same year 195,646 cubic feet of water were converted into steam by the combustion of 11,916 bushels, being at the rate of 16·4 cubic feet per bushel, or 19·5 per cwt. of coal. Lean, *Reports of the Royal Cornwall Polytechnic Society*, iv., p. 34.

†† Lean, *Historical Statement*, p. 134.

At this time an engine, of fifty inches cylinder, at *Holmbush* near Callington was reported to have raised 102·7 million lbs. one foot by the consumption of a single bushel,—which weighed 94 lbs.—or at the rate of 122·4 millions per cwt., of coal. Wicksteed, *Trans: of the Inst: of Civil Engineers*, ii., pp. 61-64; *Experimental enquiry concerning the Cornish and Boulton and Watt Pumping Engines*, p. 26. Combes, *L'Exploitation des Mines*, iii., pp. 678-679.

precedence; but it had declined in duty to 85· millions per bushel, or 101·3 per cwt.

In 1838 the *Wheal Darlington* engine again took the lead with 78·1* millions per bushel, or 93· per cwt;
„ 1839 „ *Fowey Consolidated Mines* engine regained the first place 77·8* millions per bushel, or 92·7 per cwt;
„ 1840 „ *Wheal Darlington* engine once more assumed the lead with 81·7* millions per bushel, or 97·3 per cwt.

Both these, however, were excelled by an engine, of eighty-five inches cylinder, erected by Hocking and Loam at the *United Mines*,† which performed in

1841 ..... 101·9* millions per bushel, or 121·8 per cwt.
1842 ..... 107·5* „ „ „ 128·1 „ } of coal.
1843 ..... 96·1*‡ „ „ „ 114·5 „

The system of combined cylinders—modified by placing one above the other, and admitting the steam above the smaller and upper, and allowing it to expand thence beneath the larger and lower piston§ was introduced, for a third time, at *Carn Brea* and *Great Saint George*, by James Sims;‖ but notwithstanding the high duty of from 88· to about 100· millions¶ was reported this form of engine again failed to secure favour, and its use has been discontinued.**

With improvements—if any have been made—since 1843,†† I am unacquainted.

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* "The boilers [of Taylor's engine at the *United Mines*] were made "smaller in diameter than usual, and of stronger plate, so as to stand a "higher pressure of steam". . . Also, an extra number of boilers was provided, . . . and the strength of the working parts. . . was augmented to withstand the strain. . . at the commencement of the stroke.

It was first reported in December, 1840 at..... 74·9 millions.
in July, 1841 it passed.. 100·9 „
September, 1842 „ 107·5 „
1843 „ 96·1 „

Pole, *Cornish Pumping Engine*, pp. 68-70.

† Combes, *L'Exploitation des Mines*, iii., pp. 524, 541, 553, 555, *Pl.* lxii., *Fig.* 1.

‡ Phillips and Darlington, *Records of Mining and Metallurgy*, p. 62.

§ Pole, *Cornish Pumping Engine*, pp. 69, 135-137. Combes (Piot), *L'Exploitation des Mines*, iii., pp. 615-16. Husband, *Proceedings of the Inst: of Civil Engineers*, xxiii., p. 77.

‖ James Sims (second son of William Sims) was born at Treskerby in Gwennap, 29th January, 1795, and died at Redruth, 30th October, 1862.

¶ Pole, *Cornish Pumping Engine*, p. 69. Combes (Piot), *L'Exploitation des Mines*, iii., p. 616.

** Husband, *Proceedings of the Inst: Civil Engineers*, xxiii., p. 77.

†† From 1843 to 1858 my time was mostly passed in other countries; since then it has been entirely occupied with other subjects (*Cornwall Geol: Trans:* viii., pp. i-xxxii., i-vii., 1-916).

As long as Boulton and Watt were paid in proportion to the savings they effected, it was necessary to ascertain the performance of their engines; but when—at the expiration of their patent—they quitted Cornwall, the miners—believing this necessity to have ceased—no longer registered the *duty*, and it immediately began to decline. Whatever notice may have been taken of this untoward consequence, several years were permitted to pass before active measures were taken to arrest it.* In 1811, however, the evil had so materially increased that the managers of several extensive mines determined to resume the system which had served, at once, to determine the claims of the patentees, and as a check on their enginemen.† Capt. Joel Lean—from his acquaintance with mining machinery in general and with the steam-engine in particular—was forthwith appointed *Registrar and Reporter of duty*,‡ and he and his descendants§ have ably discharged the duties of the office from that time to this. When an engine has, of a sudden, greatly exceeded its previous performance, and at once overleaped several competitors, special trials have sometimes taken place;‖ these—when made by qualified persons—have in all cases confirmed the accuracy of the *Reporter*,¶ but less experienced practitioners have now and then published much greater results.**

The following columns show the number of engines reported and their average annual *duty* as recorded by the original Registrar, as well as by his son, and grandson, from 1811 to the present

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* Lean, *Historical Statement*, p. 10.

† "The first who appears to have been sufficiently alive to the subject, "was the late Captain John Davey, of Gwinear, who was the principal "manager and engineer at Wheal Alfred; and accordingly the first report "appeared in 1811, containing three engines at work on that mine, the "average duty of which was about twenty millions: these engines were "at that time reckoned the best in the county. Other mines quickly "followed. In August of that year eight engines were reported, with an "average duty of 15·7 millions; and in December, the number had increased to twelve, average duty seventeen millions." *Ibid*, p. 10.

‡ *Ibid*, p. 11.

§ Joel Lean,....the first Registrar,.... died at Camborne in 1812;

Thomas Lean (his son), the second Registrar, was born at Ludgvan 8th February, 1784, died at Crowan 1st June, 1847;

Thomas Lean, jun., (son of Thomas), the third Registrar, was born at Crowan 26th April, 1827.

‖ Lean, *Historical Statement*, pp. 20, 31, 58-61, 97-101. *Ante*, pp. 53, 54.

¶ Lean, *Historical Statement*, pp. 58-61. *Ante*, pp. 53, 54.

** Lean, *Historical Statement*, pp. 97-101. *Ante*, pp. 53, 55.

time, expressed in millions of lbs. weight lifted one foot high by the consumption of given quantities of (Welsh) coal;—

Date.	Number of Engines.*	Duty.		Date.	Number of Engines.*	Duty.		Date.	Number of Engines.*	Duty.	
		Per bushel.†	Per cwt.‡			Per bushel.†	Per cwt.‡			Per bushel.†	Per cwt.‡
1811 ..	12	17·	20·4	1831 ..	58	43·4	51·7	1851 ..	24	50·	60·
1812 ..	21	19·3	22·9	1832 ..	59	45·	53·6	1852 ..	19	49·7	59·2
1813 ..	29	19·5	23·2	1833 ..	56	46·6	55·5	1853 ..	20	47·9	57·1
1814 ..	32	20·6	24·5	1834 ..	52	47·8	56·9	1854 ..	22	45·	53·6
1815 ..	35	20·5	24·4	1835 ..	51	47·8	56·9	1855 ..	19	46·	54·8
1816 ..	35	23·	27·4	1836 ..	61	46·6	55·5	1856 ..	23	46·1	54·9
1817 ..	35	26·5	31·5	1837 ..	58	47·	56·	1857 ..	19	43·2	51·4
1818 ..	36	25·4	30·2	1838 ..	61	48·7	58·	1858 ..	15	44·2	52·4
1819 ..	40	26·3	31·3	1839 ..	52	52·8	63·	1859 ..	23	42·6	50·7
1820 ..	46	28·7	34·1	1840 ..	54	54·3	64·8	1860 ..	24	43·4	51·6
1821 ..	45	28·2	33·7	1841 ..	50	54·5	65·	1861 ..	29	43·3	51·5
1822 ..	52	28·9	34·4	1842 ..	47	54·2	64·7	1862 ..	32	43·4	51·6
1823 ..	52	28·2	33·6	1843 ..	43	56·2	67·	1863 ..	32	43·3	51·7
1824 ..	49	28·3	33·7	1844 ..	37	54·6	65·1	1864 ..		43·	51·3
1825 ..	56	32·	38·1	1845 ..	37	55·3	66·1	1865 ..	33	42·1	50·2
1826 ..	51	30·5	36·3	1846 ..	30	52·9	63·1	1866 ..	28	42·4	50·5
1827 ..	51	32·1	38·2	1847 ..	28	52·9	63·1	1867 ..	27	43·9	52·3
1828 ..	57	37·1	44·2	1848 ..	28	52·8	63·	1868 ..	25	43·	51·2
1829 ..	53	41·7	49·6	1849 ..	26	53·4	63·6	1869 ..	25	41·8	49·8
1830 ..	56	43·3	51·5	1850 ..	27	51·9	61·8	1870 ..	22	43·	51·2

* Column 2; 1811-1838. Lean, *Historical Statement*, pp. 10, 139.
1839-1840. Pole, *Cornish Pumping Engine*, p. 70.
1841-1860. Morshead, *Proceedings of the Inst. of Civil Engineers*, xxiii., p. 46.
1861-1870. Lean, *Engine Reporter*, Passim.

† Column 3, 1811-1838. Lean, *Historical Statement*, pp. 10, 139.
1839-1870. Computed from corresponding periods in Column 4.

‡ This column has been courteously supplied by Mr. Lean, the present (and third) Registrar and Reporter.

A second series of Reports* relating to the numbers and performance of Steam-Engines worked mostly—but not exclusively†—on mines in central parts of Cornwall; was commenced, in February, 1847, and continued until May, 1858, by Mr. William Browne.‡ The following columns afford annual averages,§ deduced from his monthly observations.‖

Date.	Number of Engines.	Duty		Date.	Number of Engines.	Duty		Date.	Number of Engines.	Duty	
		Per Bushel.¶	Per Cwt.			Per Bushel.¶	Per Cwt.			Per Bushel.¶	Per Cwt.
1847	17	52·8	62·9	1851	21	55·9	66.6	1855	14	59·5	70.9
1848	17	51.9	61·8	1852	14	56·8	67·7	1856	12	58·8	70·1**
1849	20	50.6	60·3	1853	13	57·7	68·7	1857	10	52·	62·
1850	23	53.1	63·2	1854	13	59·8	71·2	1858	9	45·9	54·7

Several engines which had been reported on by Messrs. Lean at one time, were however, registered by Mr. Browne at another. The following are the annual averages of both their *Reports*.

Date.	Number of Engines.	Duty		Date.	Number of Engines.	Duty		Date.	Number of Engines.	Duty	
		Per Bushel.	Per Cwt.			Per Bushel.	Per Cwt.			Per Bushel.	Per Cwt.
1847	45	52·9	63·	1851	45	53·	63·1	1855	33	51·7	61·6
1848	45	52·5	62·5	1852	33	52·7	62·8	1856	35	50·4	60·1
1849	46	52·2	62·2	1853	33	51·	60·8	1857	29	46·2	55·
1850	50	52·4	62·4	1854	35	50·4	60·1	1858	24	44·7	53·3

* *The Cornish Engine Reporter.*

† It comprehended several engines in Devonshire as well as in East and West Cornwall.

‡ William Browne—a native of London, long resident at Saint Austell—was born in 1801.

§ Observations on engines in Devonshire, have not been used in obtaining these averages.

‖ I am indebted to Mr. Browne's courtesy for the use of all his papers.

¶ Computed from corresponding periods in column 4.

** Phillips and Darlington, *Records of Mining and Metallurgy*, p. 63.

The numbers—of mines wrought in Cornwall,—of the engines by which they were drained,—and of such of these as were reported on by the Registrars, at various times, are shown (approximately) in the following columns;—

Dates.	Mines.				Engines (Pumping).	
	Tin.	Copper.	Lead.	Total.	At Work.	Reported.
1818	——	42*	——	——	——	36†
1828	——	38‡	——	——	——	57†
1838	——	——	——	176§	150§	61†
1848	——	83‖	23‖	——	——	45†¶
1858	137**	157‖	46‖	340	——	24†¶
1868	105††	80††	17††	202††	——	25†

It is manifest that results derived from the small number of engines lately reported, cannot represent an average performance throughout the County.

Various causes—the more frequent use of diagonal engine-shafts,‡‡—the increased depth of the mines,§§—the wear of the

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* Exclusive of mines which yielded less than ten tons each, and of such as sold ores by private contract. Carne, *Cornwall Geol*: *Trans*: ii., p. 429.

† *Ante*, p. 58.

‡ Exclusive of mines which yielded less than fifty tons each, and of such as sold ores by private contract. Carne, *Cornwall Geol*: *Trans*: iv., p. 492.

§ Henwood, *Ibid*, v., pp. 464-475.

‖ For these particulars, I have to thank Mr. Robert Hunt, F.R.S., Keeper of Mining Records in the Royal School of Mines; and Mr. Henry Williams, of Alma, near Truro.

¶ *Ante*, p. 58.

** Hunt, *Journal of the Bath & West of England Agricultural Society*, xvi.

†† Hunt, *Mineral Statistics*, 1868, pp. 5-7, 19-21, 36.

‡‡ "The practice of sinking the engine-shaft, for the whole .... or for "a part of its depth, in a direction inclined or diagonal to the course of the "lode instead of perpendicularly, has increased of late years.... In August, "1841, of 53 engines reported, 27 drew their load perpendicularly; 22 drew "perpendicularly from the surface to the intersection of the engine-shaft "with the lode, and below that point diagonally; and 4 drew diagonally "from the surface. Of 24 engines reported in August, 1860, 7 drew per-"pendicularly; 10 partly perpendicularly and partly diagonally; and 1 "diagonally. Thus in.... 1841, 51 per cent. of the engines reported, drew "perpendicularly; but in August, 1860, only 28 per cent." Morshead, *Proceedings of the Institution of Civil Engineers*, xxiii., p. 47.

"Diagonal shafts were more in use now than formerly." Husband, *Ibid*, p. 75.

"Oblique rods. .. run against friction-rollers; [they], however, not only "give much friction, but are expensive and troublesome to keep in order." Pole, *Cornish Pumping Engine*, p. 120.

§§ "In. .. 1840 the [entire] length of the *lifts* attached to each engine "[averaged 144·3 fathoms; in..1860 it was 173·5." Morshead, *Proceedings "of the Inst. of Civil Engineers*, xxiii., p. 48.

boilers, engines, and *pit-work*,* the lower tension of the steam used, and the (consequently) diminished amount of expansive working,†—the inferiority of the coal now used when compared with that in use formerly,‡—and the change of interests—from resident proprietors, studious of economy, and seeking profit from legitimate mining only, to speculative strangers taking advantage of fluctuations in the share-markets and indifferent to everything

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* "The performance of Cornish engines, compared with what it was "some few years ago, has fallen off from 20 to 25 per cent. This was, no "doubt, partly attributable to the machinery getting older and from corro- "sion of the pumps." Lean, *West Briton*, lxii., (No. 3,185), p. 3.

† "As the load increases by the increased depth of the mine, the "machinery becomes weaker by age and wear, and hence, when economy is "most wanted, it is least attainable." Pole, *Cornish Pumping Engine*, p. 134.

"Formerly the practice of working expansively was carried to a greater "extent than it is now." Morshead, *Proceedings of the Inst. of Civil Engineers*, xxiii., p. 48.

"The Cornish Engine had afforded numerous examples of the success- "ful use of high-pressure steam and large expansion, perhaps half a century "before the same advantages were secured for rotary engines." Phipps, *Ibid*, p. 74.

"The principal advantage lay in the Cornish, or Trevithick's, boiler and "the use of high pressure steam.... Practically expansion had not been "carried out in Watt's engines in Cornwall, even by Watt himself." Husband, *Ibid*, pp. 76, 81. *Ante*, p. 45. Note ||

‡ "The variation in the quality of coal, even from the same pit, is "great; and the economy of attending to this will be found to vary from "one-twelfth to one-fifth of the consumption." Browne, *Cornish Engine Reporter*, No. 8.

The weight of water evaporated from a temperature of 212° by 1 lb. of

Welsh Coal	(mean of	37	samples)	was found to be	....	9·05 lbs.
Newcastle ,,	(,,	17	,,)	,,	....	8·37 ,,
Lancashire ,,	(,,	28	,,)	,,	....	7·94 ,,
Scotch ,,	(,,	8	,,)	,,	....	7·70 ,,
Derbyshire ,,	(,,	8	,,)	,,	....	7·58 ,,

Phillips and Darlington, *Records of Mining and Metallurgy*, p. 65.

"It is well-known that the evaporative power of the different coals em- "ployed in Cornwall, varies considerably, and that the coal now in use is "inferior to what it was twenty years ago." Morshead, *Proceedings of the Inst. of Civil Engineers*, xxiii., p. 47.

"Mines were now managed by committees of adventurers, each pro- "bably trading with the mine in some department;.... and it was of little "use, under such circumstances, for the Engineer to find fault with the "coals he had to burn."—Greaves, *Ibid*, p. 68.

"A large part of the falling off [in duty] was due to the inferior quality "of the coal too often supplied to the mines.... [There is] every reason to "believe that the county.... actually lost to the extent of £25,000 to "£30,000 a year owing to the rubbish supplied in the way of coal." Lean, *West Briton*, lxii., (No. 3,185) p. 3.

beside,*—have in turn been assigned for the falling off in *duty* which has, with scarcely a check continued from 1843 until now; a subject not unlikely to evoke further enquiry.

The publications of both the Registrars show that as fewer engines were reported,—or, in other words, as competition declined,—the average duty of the rest diminished.† To the managers of several considerable mines, however, the advantages of such comparison appeared so great that they recorded both the daily performance of their engines and the names of the merchants by whom they were respectively supplied with coal.‡ At *the Consolidated and United Mines*, indeed, it was stipulated that the merchant whose coal failed to perform an appointed amount of work should submit to a reduction of price corresponding to the deficiency. As mines wrought in the clay-slate of our Great Central District admit much more water than those in other parts of Cornwall,§ the cost of drainage is an important item of expenditure, and every imaginable effort has been made to lessen it. As an incentive to economy of fuel, therefore, the enginemen were, for many years, paid a small premium *(million-money)*‖ on all *duty* beyond a standard appointed specially for each engine. It is impossible to realize, after the lapse of half-a-century, the intense interest which prevailed amongst the agents of mines, and even amongst engine-men, when the monthly *Report* became due, and whilst several engineers—working, in some cases, engines of different construction—were striving for preeminence; this exciting and beneficial state of affairs, however, has long since passed away.

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* "The primary cause of this decline seems to be the indifference "of mine proprietors as to the performance of their engines. When legiti- "mate mining was less rare than it is at present, and when more mines "were held by men who intended to work them, economy of fuel was care- "fully attended to, and the managers were, in a great measure guided in "their choice of an Engineer, by the duty attained by his engines. Now, "however, so many mining operations are undertaken merely for the pur- "pose of speculating in shares, the performance of the engines is regarded "as a matter of secondary importance. Even in those mines of old standing, "which are so worked as to yield dividends, both agents and proprietors "seem indifferent to the performance of their engines. The excessive "desire for a high duty, which prevailed a few years ago, has, in fact, been "followed by a reaction." Morshead, *Proceedings of the Inst. of Civil Engineers*, xxiii., p. 48.

"At the present day adventurers in many instances [buy] shares solely "to deal with on the Stock Exchange, and [pay] no attention to the working "of the mines; and to that lack of interest in the adventurers must be "attributed the unscientific mining and all the evils resulting therefrom." Husband, *Ibid*, p. 76.

† *Ante* pp. 58, 59.

Note to Page lxii.

‡ The following extracts from accounts kept at the *Consolidated Mines*, show the performance of two of the Engines, and the names of the merchants by whom they were respectively supplied with coal, in January, 1833.

Date.	Woolf's Engine (90 inches cylinder).				Merchant.	Date.	Taylor's Engine (85 inches cylinder).				Merchant.
	Coal. Bushels of 94 lbs.	Strokes.	Duty. Per bushel.	Duty. Per cwt.			Coal. Bushels of 94 lbs.	Strokes.	Duty. Per bushel.	Duty. Per cwt.	
1st	——	——	——	——	Harvey.	1st	——	——	——	——	Michell.
2nd....	72	7,070	61·8	73·5	,,	2nd....	68	8,840	65·7	78·2	,,
3rd	65	6,400	62·	73·8	,,	3rd	62	8,510	69·4	82·6	,,
4th						4th					
5th	198	18,850	60·	71·4	,,	5th	208	25,970	63·1	75·1	,,
6th						6th					
7th	78	7,070	58·9	70·1	,,	7th	65	8,540	66·4	79·	,,
8th	68	6,750	62·5	74·4	,,	8th	133	17,330	65·8	78·3	,,
9th	72	6,820	59·7	71·	,,	9th					
10th	76	6,690	55·4	65·9	,,	10th	67	8,870	66·9	79·6	,,

These interesting particulars were supplied me by the kindness of the late Captain William Francis, jun., at that time manager of the mines.

Similar details, regarding the performance of Davey's Engine in July 1833, have been published by Combes. *Annales des Mines*, 3me Série, v., p. 619.

It has been held that the members of Provincial Institutions, such as our's, employ themselves to most advantage within their own respective neighbourhoods; such limits I have studied not to transgress.

As you have already permitted me to speak of *Mines* and *Mining* in Cornwall, I hope you will not forbid my saying a few words respecting our Mine-agents and Miners; but I must not do so without acknowledging the value and truth of the testimony offered in their favour aforetime;—by Mr. Carne,* one of the

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Notes to Page lxii., *continued.*

At *Wheal Vor* two of the engines performed, in November, 1859, the undermentioned *duty*;—

Date.	Trelawny's Engine (85 inches cylinder.				Date.	Borlase's, or Crease's Engine, (100 inches cylinder).			
	Coal. Tons.	Strokes.	Duty Per bushel.	Duty Per Cwt.		Coal. Tons.	Strokes.	Duty Per bushel.	Duty Per cwt.
1st..	—	—	—	—	1st..	—	—	—	—
2nd.	—	—	—	—	2nd.	12·6	10,180	58·8	70·
3rd..	22·	20,780	58·8	70·	3rd..	—	—	—	—
4th..	—	—	—	—	4th..	—	—	—	—
5th..	—	—	—	—	5th..	—	—	—	—
6th..	22·5	20,530	56·3	67·	6th..	—	—	—	—
7th..	—	—	—	—	7th..	36·7	29,500	58·8	70·
8th..	16·	14,330	55·4	66·	8th..	—	—	—	—
9th..	—	—	—	—	9th..	14·2	10,740	58·8	70·
10th..	16·2	16,080	61·3	73·	10th..	—	—	—	—

This instructive statement has been courteously furnished me by Mr. William Argall, Cashier and Chief Accountant at *Wheal Vor*.

At *Morro Velho*, in Brazil, the weight of vein-stone crushed by each *stamp-head* is registered daily. *Reports of the Saint John d'el Rey Company*, ix., xl., Passim. *Cornwall Geol*: *Trans*: viii., Table vii.

On the London and North Western Railway each engine-driver gives a daily account of the fuel consumed and the work performed by his engine. Mr. Francis Trevithick, C.E., of Penzance, MS.

§ Henwood, *Phil: Mag: and Annals*, ix., pp. 170-177; *Lond: and Edin: Phil: Mag:* i., pp. 287-295; *Cornwall Geol*: *Trans:* v., pp. 413-444.

‖ "Engine-men [formerly] received "*duty-money.*" Morshead, *Proceedings of the Inst*: *of Civil Engineers*, xxiii., p. 47.

* "In mentioning the improvements in mining, the increase of miner-"alogical knowledge amongst the working miners, ought not to be omitted. "Many of them are no longer satisfied with the common names of minerals, "but are now acquainted with the scientific names of the common ores and "earthy substances, and even with their constituent parts. Some have "gained this knowledge from others; but many possess their systems of "mineralogy, which they study at their leisure." Carne, *Cornwall Geol: Trans:* iii., (1824), p. 85.

most eminent writers on the mines of this County at a period not long past;—by Mr. Taylor,* who had, perhaps, a larger acquaintance with the mines and miners of various countries than any other person of his day;—and by our Honorary Member Mr. Warington Wilkinson Smyth,† Chief Inspector of Mines for the Crown and the Duchy, than whom we have no higher living authority. On the subjects regarding which these justly distinguished persons have spoken it is unnecessary for me to speak; but I should be wanting in duty to our Countrymen if I were not to add that I have seen them confronted with native superintendents and workmen in many foreign lands; and have invariably found the solution of every intricate problem in Mining Geology assigned to a Cornish agent, and every task requiring skill, resource, and courage, entrusted to a Cornish miner. I should, however, be ungrateful indeed if I were not to acknowledge

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* "The difficulties of mining are so great, that they call frequently for "sympathy and aid. I have during many years had them extended to me "by masters in the art; it is to this friendly feeling that I owe very much "of what I know upon the subject, and I have no sympathy with that un-"generous policy that would seek to profit by the failure of others. The "profit of mining must be sought in another direction; and it is one thing "which above all others that attaches me to the pursuit—that it is not ex-"clusive, but the good that is attained is commonly shared by many. The "district in which I have gathered most of my experience, is an example in "this respect; and every new invention and every step in improvement is "freely communicated and discussed, and the most important benefit has "thereby accrued in this mutual interchange of knowledge—it has been "habitual therefore to me to give as well as to receive. Cornwall is not "singular in this respect." Taylor, *Phil: Mag: and Annals*, vi., (1829), p. 391.

† "Let us not too hastily conclude that men who have not received an "education in the ordinary sense of the word are wanting in a thorough and "satisfactory knowledge of a branch of their own craft. Some of the very "best amongst our *tributers* and *pitmen* that I have known have been men "without any knowledge of reading or writing, but whose natural acuteness, "joined to constant observation during the experience of years, have en-"abled them to accumulate a store of facts, and a constantly applicable "judgment, which may be envied by those who have been brought up more "conversant with paper and print. True it is that their views are necessa-"rily limited; they cannot with safety pass out beyond the confines of their "own particular department, and in most cases they labour under the dis-"advantage of neither being able to communicate their experience nor to "rise from the position of workmen to that of managers. Whatever is to "be done in the way of instruction, Heaven forbid that anything should "interfere with the efficiency of this excellent class of men. As a work-"man I believe that our British miner is unrivalled; let us hope that "no undue meddling may shake him in that proud position." Smyth, *Lecture on Mining, delivered at the South Kensington Museum*, 24th Feb., 1862, p. 3.

how materially the judicious advice and cordial co-operation of all classes concerned in the Mining industry of every region I have visited, have furthered the progress of these labours, which have been my only passport to your favour.

Rev. J. R. CORNISH read the Lists of Presents:—

DONATIONS TO THE MUSEUM.

Bust of Mr. R. W. Fox, F.R.S.	Presented by Miss Fox.
Bust of Richard Trevithick	Mr. Henwood.
Bust of Dr. Borlase	Mr. Burnard, London.
Two Specimens of Copper-glance (Vitreous Copper or Redruthite) from St. Ives Consols Mine	Mr. Henwood.
Tungstate of Iron, from East Pool Mine	Capt. John Hosking.
Fossil Oysters, from the banks of the river Parana, South America	Mr. Augustus Smith.
Coralline, from Falmouth Harbour	Mr. G. A. Copeland.
Silver Medal,* *temp.* George II.	Mr. Tweedy.
A Silver Penny, *temp.* Ric. II. (found in a garden near Cardiff Castle;) and a Bristol Farthing, 1662	Mr. G. Woolley.
Copy of the "West Briton," Feb. 1818, containing an account of the Second Meeting of the *Royal Institution of Cornwall.*	Mr. Willyams, Carnanton.
Poisoned Arrow in Richard Lander's possession when he was murdered on the Niger	Mr. G. W. S. Iago, London.

ADDITIONS TO THE LIBRARY.

Transactions of the Royal Geological Society of Cornwall. Vol. VIII, Part I. Observations on Metalliferous Deposits. (North-western India; Chili; Brazil; North America; Jamaica; Spain; France; The Channel Islands; Ireland; Great Britain)	Presented by Mr. Henwood, F.R.S., &c., President of the Royal Institution of Cornwall.

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* On the obverse, Britannia, in peaceful attitude, supporting herself by a spear in her right hand, and, with her left, waving a palm-branch over a globe with olive foliage and emblems of literature and the arts; with laurelled shield, banners, and other warlike insignia at her feet. Legends: "Both hands fill'd for Britain"; and "George reigning." On the reverse, a Crowned Female, with laurelled sceptre in her right hand, and in her left hand a vase with which she is watering a young plantation. Legends: "Growing arts adorn Empire"; and "Caroline protecting." Date, "1736."

Transactions of the Royal Geological Society of Cornwall. Vol. VIII, Part II. Observations on Subterranean Temperature. (Chili; Brazil; North America; The Channel Islands; Ireland; England)	Presented by Mr. Henwood, F.R.S., &c., President of the Royal Institution of Cornwall.
Parochial and Family History of the Deanery of Trigg Minor. Part III, 1871. (St. Breward). By Sir John Maclean, F.S.A., Member of the Royal Archæological Institute of Great Britain and Ireland, Honorary Member of the Royal Institution of Cornwall, etc.	Ditto.
The London, Edinburgh, and Dublin Philosophical Magazine, and Journal of Science. From No. 269, December, 1870, to No. 275, June, 1871.....	Ditto.
Reports of the Mining Surveyors and Registrars (Victoria). For Quarter ending 30th September, 1870 Ditto 31st December, 1870	Ditto.
Report of the Present Condition of the Geological Survey of the Colony (Victoria, 1870.) Presented to both Houses of Parliament by His Excellency's command.....	Ditto.
Historical Statement of the Improvements made in the Duty performed by the Steam Engines in Cornwall, from the commencement of the publication of the Monthly Reports. Compiled at the request of the British Association for the Advancement of Science. By Thomas Lean and Brother, Registrars and Reporters of the Duty of Steam Engines. 1839.	Ditto.
Gulielmi Rondeletii Doctoris Medici et Medicinæ in Schola Monspeliensi Professoris Regii Libri de Piscibus Marinis in quibus veræ Piscium effigies expressæ sunt. Lugduni apud Matthiam Bonhomme. MDLIIII. and, (in the same volume) Gulielmi Rondeletii Universæ Aquatilium Historiæ pars altera cum veris ipsorum imaginibus. Lugduni apud Matthiam Bonhomme MDLV	From Rev. R. Vautier, Rector of Kenwyn.
On the Great Pyramid of Gizeh: by A. F. D. Wackerbarth, F.R.A.S., Professor of Mathematics in the University of Upsala. Translated from the "Tidskrift for Matematik och Fysik"; 1870; by the Author	From the Author.
On the Discovery of a Romano-British Cemetery near Plymouth. Communicated to the Society of Antiquaries by C. Spence Bate, Esq., F.R.S., 1871	From the Author.

British Association for the Advancement of Science. Liverpool, 1870. An Address delivered in the department of Ethnology and Anthropology, September 15, 1870. By John Evans, F.R.S., F.S.A., &c. ..... From the Author.

Report of the Council to the Fifty-first Annual General Meeting of the Royal Astronomical Society, February 10, 1871 ..... From Mr. Edwin Dunkin.

Some Account of the Megalithic Remains in South Dorset. By E. Hadlow Wise Dunkin. (Reprinted from the "Reliquary Quarterly Archæological Journal and Review," January, 1871) ..... From the Author.

The Western Chronicle of Science. Edited by J. H. Collins, F.G.S., &c., &c. Vol. I. Nos. 1—5, January—May, 1871 ..... From the Editor.

The Miners' Association of Cornwall and Devonshire. Report, 1870 ..... From Mr. Robert Hunt, F.R.S., &c.

Annual Report and Transactions of the Plymouth Institution and Devon and Cornwall Natural History Society. Volume IV. Part I. 1869—70 ..... From the Institution.

The Journal of the Royal Historical and Archæological Association of Ireland. Vol. I. Fourth Series. July, 1870. No. 3.
Ditto October, 1870. No. 4.
Ditto January, 1871. No. 5. .... From the Association.

Journal of Anthropology. Vol. I. No. III. January, 1871. ..... From the Anthropological Society of London.

Transactions of the Historic Society of Lancashire and Cheshire. New Series. Vol. X. Session 1869-70. ..... From the Society.

Proceedings of the Society of Antiquaries of London. Second Series. Vol. IV. No. IX. April 26 to June 16, 1870..... Ditto.

The Journal of the Liverpool Polytechnic Society. From February 25 to May 20, 1871. With Memorial to John Hick, Esq., M.P., Chairman of the Parliamentary Select Committee on Steam Boiler Explosions, from the Liverpool Polytechnic Society; February 27, 1871 ..... From the Society.

Proceedings of the Bristol Naturalists' Society, for 1870. New Series. Vol. V. Ditto.

From Major H. G. Raverty, Bombay Army:—

Notes on Kohan, Kashgar, Yarkand, and other places in Central Asia. By Lieut. H. G. Raverty, 3rd Reg., Bombay N.I., Assistant Commissioner, Multân. 1857.

An Account of Upper and Lower Suwat, and the Kohistan, to the source of the Suwat River; with an account of the tribes inhabiting these valleys. By Captain H. G. Raverty, 3rd Regiment, Bombay N.I.

An Account of Upper Kash-Kar, and Chitral, or Lower Kash-Kar, together with the independent Afghan State of Panj-korah, including Tal-ash. By Capt. H. G. Raverty, 3rd Regt., Bombay N.I.

The Gospel for the Afghans; being a short critical examination of a small portion of a version in the Pushto or Afghan Language, and a comparison between it and the original Greek, from which it is said to have been made. 1864. By Capt. H. G. Raverty, 3rd Regt., Bombay N.I.

On the Language of the Si-ah-posh Kafirs, with a short list of words; to which are added specimens of the Kohistani and other dialects spoken on the southern border of Afghanistan, &c. By Capt. H. G. Raverty, 3rd Regt., Bombay N.I.

A Dictionary of the Pukhto, Pushto, or Language of the Afghans; with Remarks on the originality of the Language, and its affinity to other Oriental Tongues, &c., &c. By Major H. G. Raverty, Bombay Army, Retired List; Author of a Grammar of the Pushto Language; The Gulshan-i-Roh, or Prose and Poetical Selections in the Pushto or Afghan Language, &c., &c.

A Grammar of the Pukhto, Pushto, or Language of the Afghans; in which the Rules are illustrated by Examples from the best writers, both poetical and prose; together with Translations from the Articles of War, and remarks on the Language, Literature, and Descent of the Afghan Tribes. By Major H. G. Raverty, Bombay Army.

Selections from the Poetry of the Afghans, from the 16th to the 19th Century, literally translated from the original Pushto; with notices of the different authors, and remarks on the mystic doctrine and poetry of the Sufis. By Major H. G. Raverty, Bombay Army.

Thesaurus of English and Hindustani Technical Terms used in Building and other useful arts; and Scientific Manual of Words and Phrases in the higher branches of knowledge, &c., &c. By Major H. G. Raverty, Bombay Army.

The following Papers were presented:—

On a Weapon of Stone found in a Stone Barrow at Pelynt.—By Mr. John Evans.

On Pustulopora clavata of Busk, from the Wolf Rock, near Penzance.—By Mr. Charles W. Peach, A.L.S.

Notes on the Ornithology of Cornwall, from May, 1870.—By E. Hearle Rodd.

On the Poll-Tax of 1377.—By Sir John Maclean, F.S.A.

On the Manor of Penvrane and the Advowson of St. Pinnock.—By Sir John Maclean, F.S.A.

On the insulation of St. Michael's Mount.—By Mr. W. Pengelly, F.R.S., F.G.S.

On Jews in Cornwall.—By Rev. J. Bannister, LL.D.

Notes on the occurrence of Cobalt in connection with the Tin Ores of Cornwall.—By Mr. Richard Pearce, F.G.S.

Description of a Fresco in Ludgvan Church; from the original drawing by Dr. Borlase.—By Mr. William C. Borlase, Castle Horneck.

Notes on some Antiquities in East Cornwall.—By Mr. R. N. Worth, Plymouth.

A few observations on Tintagel Castle.—By the Reverend Prebendary Kinsman, M.A., Constable of the Castle.

On an extraordinary phenomenon in the waters of the Mediterranean. —By Mr. Richard Edmonds.

Rev. W. IAGO gave an account, historical and descriptive, of an interesting and valuable Ivory Casket, the property of the Corporation of Bodmin; of a Skyppet, discovered in Bodmin Church; and of a Forcer, made of *cuir bouilli*, found at Lanivet. Mr. Iago illustrated many of his statements by means of diagrams; and he also exhibited drawings of four Tallies found at Lanivet, which he compared with an ancient Exchequer Tally. (Mr. Iago promises to furnish, for our *Journal*, a written communication on the subjects which he had now, orally, brought before the Institution; and we gladly avail ourselves of his offer.)

On the reading of Sir John Maclean's paper, "On the Poll-Tax of 1377," the earliest recorded census of the population of Cornwall, Mr. PENGELLY observed that formerly the term "Cornwall" frequently included the country so far east as the Axe, and Totness was continually mentioned as being in Cornwall.—Rev. J. R. CORNISH, however, explained that, in Sir John Maclean's Paper, the Hundreds in Cornwall were severally mentioned, and thus the boundaries of the County in 1377 were identified with those now existent.—It appeared that in 1377, the recorded number, in Cornwall, of persons above the age of 14, omitting the clergy and non-fraudulent beggars, was 34,274; which, adding the proportion for children under 14, would make the total population 51,524. At the time of the first official census, in 1801, the population of Cornwall was 189,278,—an increase since 1377 of about 267 per cent.—Dr. BARHAM thought the parish registers were not sufficiently made use of as means of ascertaining the population in early times. By studying them a very near approximation could be obtained, and it would be seen how diseases, of which we have now no experience, occasionally swept over the country. In the 17th century, the inhabitants of Tavistock deserted the town, where a plague had broken out, and encamped on Dartmoor; 642 persons, out of a population of probably 5,000, having been carried off by the disease.

Mr. Augustus Smith, after referring to observations made by him at former meetings of this Institution* on the subject of Weather Forecasts, urged that in the daily weather reports issued by Government the notice of temperature should not be limited to 8 o'clock in the morning, but should include the maximum and minimum of the previous twenty-four hours. To show the inaccuracy of the present system of Storm Warnings issued from the Meteorological Office, Mr. Smith stated that in November last, 46 storm drums were hoisted, and of these 11 only were hoisted previous to the gale, 10 with and after the gale, and 25 for which no gale whatever came. During the six months from September 1870 to February 1871 inclusive, 451 drums were hoisted, and of these only 94 were raised previous to the gale, 137 were hoisted at the time of the gale, and 220 warnings were followed by no gale; while 112 gales, with wind having a force of 8, came without any warning whatever from the Meteorological Office. These results were exhibited in Tables which had been constructed by Mr. Smith; and he observed that there was less atmospheric disturbance in Scotland than in the South and West of England, and that the climate of Scilly was more equable throughout the year than was that of Penzance; the temperature at Scilly being higher than that of Penzance in the winter, and lower in the summer. The omission therefore of Penzance from the weather tables daily published, as showing the difference of temperature between these two localities, was very much to be regretted.

Dr. Barham made some observations on the subjects of rainfall and moisture. In illustration of his remarks, he exhibited diagrams, from 1726 to the present time, representing the percentage of rainfall annually, and urged the importance of obtaining secular averages, by means of recorded observations continued through long series of years. It was not unfrequently considered that records, for periods of ten or twenty years, were practically sufficient; and engineers, engaged in the projecting of water-works, had been in the habit of adopting for their guidance the rain-fall in the three driest seasons within such periods. But a careful examination of such diagrams as were here exhibited would show that a reliance on records of rainfall within such brief periods was fallacious. For instance, it was seen that in a continuous period

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* See 46th Annual Report of the *Royal Institution of Cornwall*, pp. xxi-xxvii.

See Journal, No. II, pp. iv, vi.
,, 47th Annual Report, p. xi.
,, Journal, No. IV, p. ix.
,, Journal, No. VI, p. ix.

of 13 years, from 1739 to 1751 inclusive, the rainfall in many parts of England was much below the annual average; and therefore, water-works with supplies based on averages for shorter periods and in more recent times, might, at some future period, prove seriously insufficient.—Dr. Barham next remarked that, generally, the total rainfall throughout the year was too much relied on, without due consideration of the *monthly* fall. It was especially important to ascertain the amount of rainfall at the period of the year when vegetation was mainly affected by it. On this subject, diagrams were exhibited showing the results of observations at Bodmin, Altarnun, Truro, Penzance, and Helston; and it was remarked that at Alternun, 500 feet above the sea-level, the amount of rainfall for the year was 59, as against 40 at Truro; but at Altarnun the great bulk of the fall was in the winter months; the summer rainfall being often less at Altarnun than in the lower districts mentioned; and this smaller rainfall in summer on the higher station was combined with a considerably higher temperature than that of the western localities. One result of this was that the cultivation of cereal crops was very successful in that district, notwithstanding that its total rainfall in the year was much in excess of the other districts. On the summit of Dartmoor again, the summer rainfall was but little more than at Plymouth; its excess was in the winter, when it was, comparatively, of little consequence except as a storage supply for the future. In regard to vegetation, it was of very little consequence whether the rainfall was twenty or thirty inches in the winter months, if during the summer there was a fair degree of heat and but little rain. It was also to be observed that the humidity of any district was not to be measured by the amount of rainfall; the diagrams showed, for example, that at Truro, although in April last the amount of rainfall was less than two-tenths of an inch, that month was really one of considerable moisture; whilst in May, when the rainfall was nine times as great, the humidity of the month was actually diminished.—The amount of dryness in the air was of great importance, not only with regard to vegetation, but also as affecting the physical and mental qualities of human beings; thus the changes effected in the constitutions and the physique of Anglo-Saxons resident in America, were greatly due to the dryness of the climate, especially in the States bordering the Atlantic.

With reference to the importance of securing records of highest temperature, Dr. Barham stated that there were already sufficient data for showing the general maxima of temperature in different parts of the county; and it was worthy of remark that not only was the maximum less in Scilly than at Penzance, Helston, and Truro; but even between two places so near to each other as

Truro and Falmouth there was in this respect a very noticeable difference; at Falmouth in the winter the temperature was 10 degrees higher than at Truro; whilst in times of great heat, Falmouth was from 5 to 10 degrees cooler than Truro.

Dr. Barham also invited attention to the differences of direction in the wind at the same time within short distances, as an important factor in local changes of weather.

Mr. Hosken Richards expressed concurrence with Mr. Augustus Smith with regard to the necessity of recording temperature at various times in each day, and not merely at 8 in the morning. In the course of any one day there might be great vicissitudes of temperature, and yet the observations made at 8 a.m. on successive days might show little if any difference. Mr. Richards further remarked that in the Board of Trade tables there were certain columns, such as those concerning the amount of cloud and the force of wind, which were useless unless based on observations made with thoroughly proved and reliable instruments.

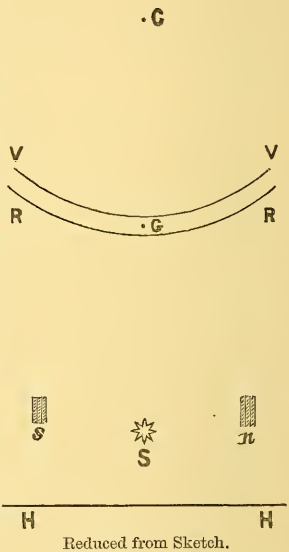
Dr. Jago made some observations on recent solar phenomena:—

Though several descriptions of the solar haloes and parhelia of April 5th last have been contributed to newspapers and other periodicals, phenomena of the kind are so very rare in these parts that perhaps you may not deem this occasion inopportune for one of the Members of this Institution to relate how they displayed themselves to his eyes; especially as there are particulars in which his description will differ from those published in *Symons's Meteorological Magazine* for May, as collected from newspapers and its own correspondents; and that in the *Western Chronicle of Science* for April—both now lying before you on the table. From these it may be gathered that, from about 3 p.m. until, or nearly until, sunset on April 5th, peculiar solar appearances were observed throughout, at least, the four most westerly counties of England. At Truro the barometer was at 30 inches; the thermometer, within twelve hours, ranged between 62 and 38 degrees; the air was dry. In the afternoon a gentle northerly draught prevailed, to be succeeded in the evening by a strong east wind and a cloudless sky. Very similar meteorological conditions are reported from the other places where the phenomena were witnessed.

As far as I am aware, nothing uncommon was to be seen when I returned to my house at 3 p.m.; and it was not until 5 o'clock that I was apprized by my wife that an intelligent domestic, who had been out, had been admiring, for an hour or more, a strange sight which, she reported, was still visible, though in a less brilliant guise. On my going into my garden, on the west side of

the house, I found the solar haloes, and they continued unchanged, essentially, until a few minutes previous to their waning. The sky was clear, except that a solitary mare's tail, a lucid and gauzy cloud, was, almost imperceptibly, creeping *eastwards*, across the haloes, so that an indiscriminating eye might readily have associated it with them. Lest some trees at the back of my garden, and the large Infirmary buildings beyond, might conceal a part of the phenomena from my sight, I started hastily, armed with only a black-lead pencil and a large sheet of paper, to place myself westward of these obstacles.

I made an unpremeditated sketch, which I present to the Institution; but I regret that, from my being unprovided with a sextant, the angular distances indicated must be regarded as only approximately correct.



Reduced from Sketch.

The time is 6 Greenwich, or 5.40 local. The sun S, an hour before sunset, is 15° above the horizon H H. *s* and *n* are two short oblong vertical patches of light, south and north respectively of the sun, but slightly further from the horizon, each manifesting, though only in a blurred manner, the prismatic colours with the least refrangible nearest to, and the most so furthest from, the Sun. Above was a bow, whose plane was parallel, or thereabouts, to the horizontal, exactly like the ordinary rainbow, with, as in the patches of light, but very distinctly, the Red R R next, and the Violet V V most remote from the Sun. Speaking of the objects already described as if limited to their middle lines or points (as the case may require) the bow constituted about one-sixth of a circle, whose centre C plainly lay in the azimuthal plane passing through the Sun, though I could not settle in my mind whether C was coincident with my zenith, or lay slightly to the west of it, so difficult was it to decide from so small an arc. I estimated that the imaginary lines CG and SG were equal, and either of them twice as long as S*s* or S*n*. I also thought it probable that a circle described from G as a centre, and of radius G S, might pass through *n* and *s*. Thus *s* and *n* would be regarded as coloured parhelia, at the intersections of these two imaginary, though to me invisible, circles.

Thus, had I no other guide than my own observations, I should have surmised that the phenomenon was an incomplete variety of the circumzenithal halo accompanied with mock suns (parhelia), such as are frequently seen in cold climates, and which have been shown by mathematicians to be producible by crystals of ice, of definite forms, floating in the air (it must have frozen in the higher air on April 5th), and as have been imitated by M. Bravais by means of prisms and other crystal-like forms of glass.—The halo had dissolved before the sun had set, as if dispelled by a brisk east wind. The full moon of that day, rising as the sun was setting, became visible from the drawing-room windows of my house soon after it had surmounted the horizon, as the crest of the hill to the east of them is only a little above their level; and it was watched thence by my wife until 10·30 p.m. (whilst I had several out-of-door looks) for any unusual lunar phenomena; but none appeared.

A word, however, by way of comparison, about observations recorded elsewhere. It is plain from the description in the *Western Chronicle of Science*, that the Editor was absent from his residence on Harbour Terrace, Falmouth, on April the 5th; and therefore the *data* for the diagram he gives were not obtained by himself in that neighbourhood; nor is there any hint as to where, or by whom, they were obtained, any further than that it represents what was "seen by many observers throughout the west." This diagram places two parhelia at the extremities of a discernible horizontal diameter of a visible bow constituting five-sixths of the circumference of a circle described round the Sun as a centre, and whose radius equals (not being merely half of) the inverted bow of one-sixth of a circle above. There are other points in the description that are not coincident, and some that *are* coincident, with mine. It is also subjoined that at 7·30 p.m. the moon seemed to be at the intersection of the arms of a reddish cross. It would have been interesting to know whether all the solar phenomena mentioned in the *Chronicle*, forming a completer system of haloes than any one described in *Symons's Magazine*, were observed at one place, or if they are summarized from different sources of information. However this may be, that the phenomena were dissimilar as seen at places widely apart is clear from the accounts in the Magazine. At Bideford, for example, they were limited to a prismatic horse-shoe halo around the Sun. At Sherborne, only "pillars" of light projecting from the Sun were seen.

From the *Western Chronicle of Science* we learn that the meteorological incidents of April 5th were not confined to Haloes; for we are informed that two mirages were seen by a lady from Harbour

Terrace, Falmouth; a "reversed" image, high in air, of a ship far out in the bay, and a "reversal," in less perfect form, of the houses in Flushing (situated two-thirds of a mile from the Terrace and 100 feet beneath it). These reversed images being, as I should fancy, at the observer's eye, 140° apart, and the objects seen reversed being some miles asunder, there must have been, widely spread, an abnormal state of the atmosphere; whether the effect was rendered by an unusual reflection at reflecting strata floating in the air above the objects reversed, as is conceivable from the information supplied to us; or, as is more likely, perhaps, and as the Editor seems to think, from unusual refraction,—in which case, they would be examples of simple *vertical* refraction.

Familiar as I have been with the coast about Falmouth, it has never been my good fortune to witness a mirage there—nor indeed have I seen one anywhere; but the notice of these mirages has brought to my recollection that at one of our Annual Meetings (See *Journal*, No. 1, 1864, p. 58) there was read an account of a very remarkable mirage seen from those shores under very different meteorological conditions; and I take the liberty of referring to it, in connection with the instances just spoken of, on account of the interest attaching to the mode of production of such phenomena, whether in these regions or else-where; and because, I believe, it can be shown, conclusively, that this mirage was due to a singular combination of *vertical* and *lateral* refraction.

About 6 o'clock one evening in the middle of July, 1863, the air was oppressively warm and close, and no sky could be seen anywhere, for compact clouds concealed it, and covered with a brassy hue the setting sun. At this time, as Mr. Nicholas Michell (the author of many poems) relates, he and his wife were standing on the hill on the Falmouth side of Swanpool, looking (eastward—away from the sun) into the bay towards Pendennis Castle, when there appeared to rise from the surface of the water, commencing about a quarter of a mile from where they stood, and through an extent of about half a mile in length and a quarter of a mile in breadth, a portion of Truro and Calenick Rivers (an every-day scene to him in his boyhood). The slopes of Park fields were depicted, and, as the tide was low, the mudbanks and tortuous channels in Truro and Calenick Creeks were depicted as a "perfect landscape."

At low tide, Swanpool Hill is about 100 feet above the sea level. The landscape was translated seven miles due south, over hills, in the parishes of Kea, Feock, and Mylor, of (say) 270 feet above that level, (unless, stranger still, it was carried along the sinuosities of the river and round Pendennis) and dropped behind Pendennis Castle, which, at its highest point, is fully 250 feet above low water. It is not conceivable, as the account suggests,

that "the clouds threw down the picture", for reflecting clouds would have placed the picture above themselves; and, to say nothing about inversion by reflection, it is obvious that, were there no intervening hills, any mirror that should place the picture where it was seen would have the spectator at its back. The rays of light radiating from the points of the objects imaged must have deviated by refraction horizontally through an angle of nearly 90°; and vertically, first downwards, after cresting the Kea hills, through many degrees to the level of the spectators' eyes; and even below that level, afterwards to ascend as if coming up, at a little distance out, from the bay beneath their feet; so that here were considerable vertical refractions, the one succeeding the other, in opposite directions. Altogether I doubt if there is on record a more extraordinary instance of unusual atmospheric refraction.

Such phenomena are so very uncommon with us that, on turning over (truly with no great care) our Reports and Journals, I found only one other notice of a mirage; and, as I am on the subject, I will say a few words about it, by way of taking stock of all we have published in that way. Besides, if a real mirage, as therein described (See Report for 1841), it was a very curious one,—perhaps unique. Through the spray and mist of Perran Porth the setting sun was seen, in part, through a slit (so to speak) in a cloud, and it looked red; while several red images of it were seen *transiently* flitting about near it; not one red image appearing except in proximity to the sun. Besides these, however, there were unusual *green* images, which were much more abiding than the red ones, and were visible even against the dark cliffs at a distance from the sun. Now when we know that ordinary luminous impressions upon the retina only last one-third of a second of time before they fade away to re-appear as more persistent *spectra* of the complementary colours, bright enough to be visible when dark surfaces are looked at; and when we remember that green is the complementary colour of red, we are led to suspect that the observer by regarding the sun with unsteady eyes, received from it detached luminous impressions upon his retina, the lingering spectra of which they transported against the cliff when the eyes were turned that way. It is not quite impossible that several images of the sun might have been produced by unusual refraction; but the *green* ones leave no doubt in my mind that we have here an ocular illusion, and no mirage at all.

There is nothing astonishing in the fact of even an accomplished scholar, with no knowledge of physiological optics, thus being deceived; and it is well always to bear such a possibility in mind when reading accounts of rare optical phenomena, such as those concerning the Halo and accompanying appearances on the 5th

April. For instance, whenever we look at a remote luminous disc with the pupil of the eye partially covered by the eyelids, the watery fluids along their margins occasion upward and downward beams of light to issue from it, and a casual observer, whose attention had never been drawn to this contingency, might readily, when in expectation of strange phenomena, accept these beams as of such a nature.

Thanks were voted to the contributors of Papers and other communications, and to the donors to the Museum and the Library. Thanks were also voted to the President, who had so ably filled the Chair on this occasion; and reference was made in very laudatory terms, to the elaborate works which he had just published as volume VIII of the *Transactions of the Royal Geological Society of Cornwall.*

There were present at this Meeting:—The President, Mr. W. Jory Henwood, F.R.S., F.G.S., &c.; Dr. Jago, F.R.S., a Vice-President; Rev. J. R. Cornish, one of the Secretaries; Mr. H. M. Whitley, Assistant Secretary; Dr. Barham, Rev. Dr. Bannister, F.S.A., Mr. W. Copeland Borlase, F.S.A., Mr. John James, Mr. Alexander Paull, and Rev. H. S. Slight, Members of the Council; and Mr. R. H. Carter, Mr. J. G. Chilcott, Mr. J. H. Collins, F.G.S., Rev. E. N. Dumbleton, Mr. G. Freeth, Mr. E. Hawke, Rev. J. T. Huntley, Rev. W. Iago, Mr. Hamilton James, Mr. W. H. Jenkins, Mr. J. B. Job, Mr. H. Spry Leverton, Captain Liddell, R.N., Mr. Latimer, Mr. W. Pengelly, F.R.S., F.G.S., Mr. W. J. Rawlings, Mr. Rendall, (Wadebridge), Mr. Hosken Richards, Mr. Reginald Rogers, Rev. Saltren Rogers, Mr. Augustus Smith, and many Ladies.

THE AUTUMN EXCURSION.

The Excursion, this year, took place on Monday and Tuesday the 14th and 15th of August; and it comprised objects of antiquarian, geological, mining, and picturesque interest in the district west of Penzance.

The rendezvous on the first day was at the Penzance Railway Station; and at this place, about 11 a.m., there was an assemblage of nearly a hundred ladies and gentlemen, the latter including about 40 non-residents in Cornwall who had been attending a Meeting, at Plymouth, of the British Medical Association, and who, previous to their arrival at the Railway Station, had visited St. Michael's Mount, and, on invitation from Mr. Congdon, of Marazion, had breakfasted, (by the kind permission of Sir Edward St. Aubyn) in the mansion on its summit.

In vehicles of various kinds, the numerous party proceeded through Penzance, and onward, by way of Street-an-nowan, over hills which commanded a succession of magnificent seaward views, to Trewoofe, where they inspected the Fogou; and thence journeyed to Bolleit, visiting successively "The Pipers," the "Dawns Myin," "Treryn Dinas," and the "Logan Rock;" after which they proceeded to Land's End, and partook a very acceptable and substantial refection, in the course of which, various complimentary toasts were given and acknowledged. The party, in various groups, then passed a pleasant hour in rambling about the cliffs and in the enjoyment of their extensive and variedly interesting scenery; and then drove, through Sennen and St. Just, to Botallack and its far-famed mine. Its surface works were viewed with great interest; and, time not permitting of descent into its shafts and levels, much information respecting the operations subterranean and submarine, was given by Captains Henry Boyns and Nicholas Hocking and other agents. The party were then conducted to the Account House, where tea was hospitably provided by Mr. Stephen Harvey James, and, under supervision by the Misses James, the welcome repast was thoroughly enjoyed. Thanks to Mr. James, and to Captain Henry Boyns and his colleagues, were tendered by Mr. Henwood, the President, on behalf of the Institution; and Dr. Steele, of Clifton, in speaking for the Members of the Medical Association present and for other strangers, gave the health of the Misses James and the Ladies.

Lurid clouds approaching with the closing darkness, a sudden start was made for Penzance; and, during the journey thither, there was one of the finest displays of summer-lightning, commonly termed "collebrands" in that district, that was ever witnessed. Flash succeeded flash at the rate of half-a-dozen a minute; some of them being compounded of sheets and forks and coruscations of the most brilliant character.

The second day's start was made, at half-past nine, from Causeway-head, Penzance; the first part of this day's excursion being, by way of Madron, to Lanyon Cromlêh; but although the weather was favourable, the atmosphere was not sufficiently clear to enable the party to enjoy the fine panoramic landscape of which Lanyon Hill is the centre. Dr. Barham gave an interesting account of the supposed origin and purpose of Cromlêhs, and described the probable mode by which their ponderous capstones had been raised.

After giving expression to differing theories as to the purpose of this and similar structures, the excursionists moved on about half-a-mile to Lanyon Bridge, where, as had been prearranged by programme, they divided into several parties, the objects of interest on all sides being so numerous. Some proceeded to inspect the Men-an-tol, the Menscryfa, and the ancient "crellas," or huts, at Chysauster; others passed on to the Beehive Huts and fallen Cromlêhs at Bosphrennis; whilst those of decided geological tastes took a long walk to Polmear Cove, to see its interesting junction of granite and slate. Others, remaining in their vehicles, proceeded slowly on to Treen, in Zennor, and thus had ample opportunity for admiring the wildly picturesque scenery of hills and jutting headlands, with here and there a secluded cove and primitive hamlet, and, near Carn Galvar and in Parmear, habitations whose modes of construction seem to indicate remote antiquity.

An exhilarating drive over Zennor hills brought the excursionists to St. Ives, where the church was inspected, with admiration of its fine carved-work and other details; while some of the visitors strolled into the churchyard, to enjoy, from its terrace-like seaward walls, a good view of the harbour. In the meantime, the Mayor, Mr. J. M. Kernick, had invited the party to the Town Hall that they might see and admire the antique loving-cup given to the corporation by Sir Francis Basset, who procured for the borough its first charter of incorporation. From St. Ives the excursionists proceeded to the beautiful grounds of Tregenna Castle, where a sumptuous collation, hospitably provided by the President, was served on the lawn, with permission from Mr. Stephens. Various toasts were given, including that of

"The Royal Institution of Cornwall," which was duly acknowledged by the President; and, after further interchange of courtesies, the party left for the Hayle Railway Station; and so ended two memorably pleasant days, the satisfactory arrangements and conduct of which were largely due to the energetic leadership of the President, Mr. W. J. Henwood, F.R.S., and to the very efficient aid rendered by the Assistant Secretary, Mr. H. Michell Whitley.

Amongst those present were Mr. Henwood, the president; the Rev. J. R. Cornish, hon. sec.; Mr. H. Michell Whitley, hon. asst. sec.; Rev. W. Wilkinson and Mrs. Wilkinson; Rev. W. Iago, Bodmin; Dr. Jago; Dr. Barham; Mr. J. Olver and Miss Olver; Miss Pooley; Miss Tregarthen; Mr. Bottrell; Mr. Ralfs; Miss Roberts; Mr. F. Barham and Miss Barham; Mr. Wm. Cornish; Mr. Lanyon; Capt. Scott; Mr. Truscott; Mr. Hamilton James, Mrs. James, and Miss Gatley; Mr. W. Phillips, Mr. Phillips, and Miss Phillips; Mr. H. S. Leverton; Mr. T. Cornish; Mr. H. Carlyon; Mr. S. H. James and the Misses James; Mr. Moffat; Mr. and Mrs. Norton; Mr. W. C. Borlase; Mr. C. C. Ross; Mr. R. H. Williams; Mr. R. H. R. Nicholson, Hull; Dr. and Mrs. Rogers; Dr. Taylor, Cardiff; Mr. Francis Truscott, Falmouth; Mr. F. R. Anderson, Hessle; Mr. A. C. Roberts, Plympton; Mr. J. Woodman, Exeter; Mr. Mason, Bath; Mr. James R. Colthurst, Bristol; Mr. George Lanyon, Falmouth; Mr. Steele, Clifton; Mr. J. G. Hall, Swansea; Mr. Probert, Merthyr Tydvil; Mr. William Cornish, Falmouth; Dr. Chadwick, Leeds; Mr. J. W. Baker, Derby; Rev. G. L. Church; Dr. Philipson, Newcastle-upon-Tyne; Mr. Charles Harper, Bath; Mr. John H. Phillips, Manchester; Mr. P. R. Cresswell, Dowlais; Dr. George P. Rugg, London; Dr. John C. Langmore; Dr. Worthy; Dr. Howatt, Glasgow; Mr. and Mrs. Turton, Wolverhampton; Dr. Clark; Dr. and Miss Tilt, London; Mr. Stamford Felce, London; Dr. Gervis, Ashburton; Dr. Wade, Birmingham; Dr. Wood, London; Dr. Crossby, Nice; Dr. Underhill; Mr. Andrew Davies, Swansea; Dr. de Berdt Hovell, London; Mr. Bartlett, London; Dr. Ceely, Aylesbury; Surgeon-Major Atchison; Mr. Ernest Hart, London; Mr. Dick, Penair; Dr. Victor Tagialaki; Mr. James Pollard, Torquay; Miss Higgs and Miss J. Higgs; the Worshipful the Mayor, and Mayoress, of St. Ives; Dr. J. B. Montgomery; Mr. Hosking; Capt. and Mr. W. J. Pooley; Capt. Hollow; &c.

FIFTY-THIRD ANNUAL GENERAL MEETING

OF THE

ROYAL INSTITUTION OF CORNWALL,

Held on Tuesday, November 14th, 1871.

This Meeting was held in the Institution Lecture-Room, and there were present: Mr. W. J. Henwood, F.R.S., President; Mr. J. St. Aubyn, M.P., Dr. Barham, Mr. W. Copeland Borlase, Rev. J. R. Cornish, Mr. J. H. Collins, F.G.S., Mr. Henderson, C.E., Dr. Jago, F.R.S., Mr. H. Spry Leverton, Mr. W. J. Rawlings, Mr. Tweedy, Mr. W. Tweedy, Mr. Whitley, and Mr. D. G. Whitley.

The PRESIDENT, in opening the meeting, said that for some considerable time after this Institution was founded, one general meeting in the year sufficed; as well for the transaction of ordinary business as for reading the communications which had been presented. But at last these became so few that they amounted to no more than four pages and a half for one entire twelvemonth (1854). At length, however, it was considered that Spring would be a much more agreeable season than Winter, for all who favoured the meetings with their presence, and especially for those from a distance. In 1860, therefore, the first Spring Meeting was held. The experiment was perfectly successful, and, to the present time, their prosperity had regularly and uninterruptedly advanced. The communications with which they were favoured began immediately to increase, and—without at all declining in quality or in interest—they had gone on increasing. In 1863 it was deemed advisable to alter their mode of publication; and he believed that the three volumes of the *Journal of the Royal Institution of Cornwall*, since issued, would bear favourable comparison with the publications of any other Society in the West of England. For the commencement of a fourth volume there was already a supply of excellent materials, so ample that the Council had been compelled, with courteous permission from the authors, to reserve some of them to future opportunity.

TREVALGA CHURCH.—Dr. BARHAM read a letter, dated 11th November, which he had received from Sir John Maclean:

"A few weeks ago, I visited the ancient church of Trevalga, in the Deanery of Trigg Minor. On the north side of the chancel is a small Chapel, 11 ft. by 10 ft., of the First-Pointed period. It is now in a sad condition though untouched, materially, since the date of its erection. It is lighted by an elegant double-lancet in the East, and by a single-lancet in the North wall. In the South-East angle is a small round-headed piscina, and at the angle of the splay of the Eastern window is a large bracket, on which formerly stood the image of the saint to whom the chapel is dedicated. There remains also what appears to be a ledge at the bottom of the window, which would lead one to suppose it to be the remains of the old Altar-slab, except that an external examination shews that the window has been walled up about a foot above its original base.

My design, however, in writing is to call attention to another feature in this interesting Chapel, which is, perhaps, unique, at least in Cornwall. Observing that some part of the whitewash, with which the walls are thickly coated, had been peeled away, shewing colouring underneath, the Rector, the Rev. W. P. Roberts, courteously gave me permission to examine it further, and finding that the whitewash of ages easily separated from the wall, aided by the hard surface underneath, in large flakes, with the assistance of a long screw-driver I soon stripped off sufficient to disclose the whole design of the ornamentation. It is undoubtedly co-eval with the building, and the colours are as bright as when laid on some 600 years ago. The design is exceedingly simple, and very effective. The Arches of the windows are painted in masonry, in Indian red and bright orange, the divisions being white jointed with black lines. This ornamentation of the arches is supported by a column painted at the angles in red lines, with an orange capital foliated with black. The Eastern window is further enriched by a foliated coronal in red. The walls are ornamented throughout their whole surface, in masonry, with red lines, the horizontal lines being single and the perpendicular double, whilst the divisions are enriched alternately by red scroll-work and black cinquefoils. The head of the East window is ornamented with a quatrefoil within a striped border of black, white, and orange. The whole surface of the walls is of a pale grey colour.

The church, which is of considerable antiquity, is, generally, in a very dilapidated condition; and an effort is being made to raise funds for its restoration. It is a work which commends itself to all who love our ancient churches; and if that restoration be carried out in the spirit of a real *restoration*, viz., replacing what is decayed, stone for stone and wood for wood, in all their details, and replacing what is lost, so that it may be restored, as nearly as possible, to the condition in which it left the ancient builder's hands, it should receive the cordial support of all Cornish men. At all events, the ancient and interesting work of art which I have above described, ought to be replaced in the restored Chapel."

MORTALITY AMONGST MINERS.—Dr. BARHAM explained a number of diagrams which he had prepared to show the relative mortality amongst miners compared with that of the general population of the country, a subject which he had lately dealt with at Plymouth. The diagrams conveyed to the eye an accurate notion of the mortality at various ages, compared with persons engaged in other occupations. He considered it a subject fairly within the

province of that institution, especially in conjunction with the two other great County Societies, to discuss, and, if possible, to find some remedy for the evil. Mr. Tremenheere, the other day, at the Geological Society's meeting at Penzance, suggested that they should have a body of teachers at Penzance, to give lectures and instruction on scientific subjects, but Dr. Barham thought Penzance would not be able to support such a body of teachers. The better way would be for the different scientific institutions in the county to unite and each have a teacher, who would have classes in each town or central place, and with the support which they might obtain from the Government the scheme might be practicable. The diagrams he exhibited were derived chiefly from the report of the last commission which sat on the subject, and the results arrived at by Dr. Farr, the Registrar-General. These results for Durham and Northumberland showed that mining or working underground was not of itself by any means necessarily the cause of great mortality. Up to a certain age there was not much difference in the health of the miner and that of the general population, but when they came up to the ages between 40 and 60 there was a very great difference in favour of the general population. There were many more deaths from what was called consumption, amongst the miners in Cornwall than in any other mining district in England, but at an early age there were fewer than in any other district. He thought it was his duty to bring this matter before the meeting, with the view of ascertaining more exactly what the cause of this increased mortality was; and whether from such bodies as that some suggestion might not be thrown out which might moderate the evil. He thought science could not be better applied than in lessening such an evil as that. With regard to heart disease, he should say that it was not more fatal amongst miners than amongst the population generally; and with reference to accidents, they were less numerous in Cornwall than in other mining districts, and only slightly more frequent than amongst the population generally. A certain proportion of the miners quitted the employment after a time, and took to farming and other pursuits; for these, and for emigrants, some corrections must be made in our estimates from mortuary registers. Taking the general mortality amongst miners now, it was little if at all improved compared to what it was when the first commission was held on the subject.

The CHAIRMAN said, perhaps it might not be out of place to mention a circumstance or two noticed by his friend and neighbour, Mr. Higgs of Penzance, who was long a considerable—if not indeed the principal—manufacturer of mining-candles in the West.

Mr. Higgs had told him some 20 or 30 years ago, a considerable alteration was made, by the use of better grease and by the substitution of white cotton wick of smaller size than the brown wick (made, Mr. Henwood believed, of hemp or flax) which had previously been employed. Objection to the difference of price—which amounted to some 3d. or 6d. per dozen—was, however, made by the miners, and much prejudice on the part of the workmen had to be overcome; to the present time, indeed, the thick wick was preferred in some places. Mr. Higgs added that, owing to this alteration in the quality of the candles, and to improved ventilation, there had not been a single sufferer from miners' consumption, on the Club of either of the several mines of which his firm had been the pursers, for nearly twenty years.

Mr. St. Aubyn said the mortality of miners was a subject in which he had taken a deep interest, having, in conjunction with his late colleagues, Mr. Davey and Mr. Kendall, been a member of the Commission appointed in 1862 to enquire into that particular subject. It had been a matter for regret that the pressure of public business had not allowed the recommendations of that Commission to be followed up by an Act of Parliament. The Mines Regulation Bill, which would be before Parliament next Session, was intended to meet, as far as possible, some of the evils to which Dr. Barham had referred. It was generally agreed, he believed, by all who had looked into the subject, that accidents might be prevented, to some extent, by legislation; but in reference to miners' diseases it was never very clearly ascertained whether those diseases arose from bad ventilation, or from climbing from great depths, or probably from a combination of the two. The provisions of the Mines Regulation Bill, so far as it related to metalliferous mines, would attempt to deal, he did not know how far successfully, with the case of accidents; but nobody had been able to frame a clause, which would work, in an Act of Parliament, with regard to regulating ventilation. It had been impossible to produce anything more than a generally worded clause, to the effect that proper ventilation should be provided; and therefore any any assistance in that direction from gentlemen connected with this Institution, or others, would be of great value when the measure came to be considered next Session. He hoped the provisions of the Bill, so far as related to accidents from explosions in tamping, falling down shafts not properly protected, and so on, would prove useful.

Mr. Rawlings suggested that there should be some means of ascertaining the number of miners that annually left a district.

Dr. JAGO remarked that Mr. Rawlings's suggestion was pertinent, even if confined to men moving from one home district to another, and especially so if extended to men leaving the country. For the results of Dr. Barham's elaborate statistics could only be accepted as needing no correction on the assumption that emigration proceeds equally and alike among all the classes compared in them. In the absence of statistics bearing on this special point, he could only say that he had been led to believe that the Cornish miner has a peculiar propensity to try his fortune abroad. Some twenty years ago, he heard the experienced manager, in this county, of the greatest mining firm in the world express his astonishment at their readiness to venture into any land or any climate whatever; for the firm was beset with volunteers whenever they wanted hands, and of course sent out none but those in the prime of life and of certified health. Again, it has been a standing complaint of our oldest mine-agents that a *new* impediment has arisen to home mining operations in that the ablest men get allured away into the many metalliferous fields that modern "prospecting" has brought to light, leaving them to work their mines with boys, invalids, and old men. Thus, according to their statements, the majority of the missing men—say of from 25 to 40 years—have not died at home, but have gone abroad, whilst an undue proportion of youths are counted in our mines. Finally, the miner, in hopes of making a fortune abroad, and often going into places unprepared for households, in most instances, if married, maintains his wife and family at home; and should he ever return, with his hopes realized, he ceases to be a miner. The obvious effect of all this is, in so many ways, to exaggerate the gloomy conclusion of Dr. Barham's statistics as to the deleterious nature of metalliferous mining. His own experience of miners' complaints confirmed generally that of Dr. Barham. For instance, he did not think miners more prone to heart disease than agricultural labourers. He would not, however, dilate on this subject, but content himself with observing that he was inclined to suspect that in the hurry of harassing medical practice, such as that of most mine surgeons, the practitioner, in certifying of the cause of death, a service for which the State left him unpaid, was often so brief or careless as to deprive statistics founded on such certificates of much of their apparent value.

The following Papers were read:—

Note on a Sub-Marine Forest at Market Strand, Falmouth.—By H. Michell Whitley, C.E.

On a British Celt found by Mr. J. Jope Rogers, near Helston.—By Mr. Albert Way, F.S.A.

On an Urn found at Angrouse, in Mullion.—By Mr. W. Copeland Borlase.

In relation to Mr. H. M. Whitley's discovery of a Sub-marine Forest at Falmouth, Mr. HENWOOD stated that, about 35 years ago, after a tremendous gale, the submarine forest in Mount's Bay was very much exposed, and large trees were thrown up on the shore; but that which he particularly wished to mention was that at Tolcarne, west of Penzance, an ancient canoe was driven ashore. What its original position might have been there was no means of ascertaining. He saw it on the beach, and it was some eight or ten feet long, and quite black, just like bog oak. It was hollowed out of a single tree, and he had some impression that there were remains of a broken paddle in it. There was a thwart, and above it a small fragment of a broken mast, and when that was taken out, a coin was found under it, which was believed to be Roman. The canoe would hold three or four persons; he did not know what had become of it. Dr. Boase was with him at the time. He was not aware that the discovery had been recorded, and he mentioned it now in order that the fact might not die with him.

Dr. BARHAM referred to the mention by Festus Avienus, in his poem describing the voyage of Himilco, of the use, on the tin coasts, of small canoes, or coracles, covered with skins.

Mr. RAWLINGS said he remembered that, on the occasion referred to by Mr. Henwood, there was washed ashore a considerable quantity of decomposed leaves and other vegetable matter, and that some fifty or sixty loads of it were sold as "Mount's Bay Guano."

THE COUNCIL'S REPORT.

The Council have much pleasure in congratulating the members of the Institution on its present condition, and also on its future prospects.

During the past year twelve new annual subscribers have been elected, whilst the losses by death have been only four. Amongst these losses, however, Mr. W. Rashleigh, has to be enumerated, who for many years has been a frequent donor to the Museum.

The Treasurer's Statement of Accounts shows that the total receipts, including a credit balance brought forward from last year of £107. 15s. 8d., were £281. 3s. 2d., whilst the expenditure was £244. 15s. 5d.—The present credit balance is therefore

£36. 7s. 9d.—The expenditure includes the cost of fitting up and furnishing the rooms vacated by the Cornwall Library and Reading Room, which amounted to £88. 10s. 9d.

The Council have the pleasure of informing you that they have received a donation of £10 from G. F. Remfry, Esq., towards the paying off of the Mortgage Debt.

The present condition of the Museum has received the attention of the Council. They suggest that, as far as the funds permit, some of the specimens should be replaced, and certain cases cleaned and refitted. They also desire again to remind the possessors of antiquities and other objects illustrating the history of the county, of the great boon which they would confer on all interested in Cornwall by depositing them in a public Museum, where they would be always available for the advancement of science. In many parts of the county highly interesting remains of antiquity are still unexplored. The task of exploring them, however, can be but inadequately carried on by a single person only; and the articles obtained during such explorations are scarcely less available to the public in their old repositories than they are when transferred to private collections.

During the year ending with July, 1871, the following numbers of visitors were admitted to the Museum. Admitted free, 8,558; by ticket, 140; by payment, 112. Total, 8,810.

Amongst the valuable additions to the Museum made during the past year, is especially to be noticed a block of Jews-house tin found in Tremellack Moor, in the parish of Madron, which has been purchased for the Institution.

Mr. Collins has commenced going through our collection of Minerals, with a view to making a complete catalogue, giving their localities, &c., as far as possible. He has already gone through five of the cases in the long room, and hopes to complete his work in the course of a few months.

The two-day's excursion to the Land-End District was joined by between 80 and 90 ladies and gentlemen, and will rank amongst the most successful undertakings by the Institution. A large number of gentlemen who had been attending the Meeting of the Medical Association at Plymouth during the preceding week came down to join it, and, whilst they contributed greatly to its success, found its guidance very valuable in visiting the principal antiquities of the West Country. In consequence of the hospitality of our President in entertaining the party in the lawn of Tregenna Castle, kindly placed at his disposal by the proprietor, the financial statement of the Excursion shews the handsome balance of £15. 6s. 9d. in favour of our funds.

The Papers which have been contributed during the year to

our Meetings and Journal will be found to contain a large amount of exceedingly valuable matter, bearing especially on the Mineral produce of the County, and on its Natural History and Antiquities.

The Council have again had under consideration the question of the issue of a second number of the Journal in each year; but after careful investigation they have decided on recommending that it be postponed until the increase in the number of annual subscribers shall clearly warrant it. They offer this advice with great regret, as the number of papers contributed in each year is much in excess of the capacity of a single number.

Two Conversaziones were held during the past winter and were fairly attended. They afforded opportunities for the discussion of some objects of interest for which the ordinary meetings could not have afforded time.

The Meteorological Observations, which date from 1838, and which increase in value every year, have been continued as usual by the Curator, Mr. Newcombe.

Since the last Report was issued the books belonging to the Institution have been removed from their former inconvenient situation to this Room in which we meet, which has been duly prepared to receive them; and, including as they do, the Transactions of various Societies, and other scientific publications, they form a valuable collection available to members for reference. The Council hope gradually to extend this department, and they would be glad to receive donations of books bearing on scientific and antiquarian subjects, especially any relating to the county. On the table in the outer room are placed the current numbers of magazines and other publications, and on Monday Evenings both rooms are open until 10 o'clock p.m.

Mr. R. N. Worth, who has on many occasions favoured us with valuable communications on subjects relating to the county, has been elected a Corresponding Member.

The Council recommend that the office of a Second Assistant Secretary be created, and that Mr. William George Dix be elected to fill it.

They cannot allow the President to retire from office without expressing their very high sense of the services which he has rendered to the Institution. Although living at some distance from Truro, he has personally discharged his duties with the most unremitting assiduity, whilst the Addresses delivered by him during his term of office will rank, from their high intrinsic value, and the original research which they display, amongst the most valuable of our publications. His great work on Metalliferous Deposits and Subterranean Temperatures, published under the auspices of the Royal Geological Society of Cornwall, has ap-

peared during his term of office as President of our Institution. They have great pleasure in proposing him for election as one of the Vice-Presidents of the Institution.

The Council are exceedingly glad to be able to propose John St. Aubyn, Esq., M.P. for West Cornwall, as Mr. Henwood's successor in the office of President.

The Council's Report having been read by Rev. J. R. Cornish, it was resolved unanimously, that it be received, adopted, and printed.

The following resolutions were passed unanimously:—

That the thanks of the Society be given to the Officers and Council for their services during the past year; and that the following gentlemen form the Council for the ensuing year:—

President, Mr. JOHN St. AUBYN, M.P.

Vice-Presidents.

Mr. Roberts,
Mr. H. S. Tremenheere, F.G.S.,
James Jago, M.D., Oxon., F.R.S.,
Lieut.-Col. Tremayne,
Mr. W. J. Henwood, F.R.S.

Mr. Tweedy, *Treasurer.*

Mr. Whitley *and* Rev. J. R. Cornish, M.A., *Secretaries.*

Assistant Secretaries: Mr. H. Michell Whitley *and* Mr. W. G. Dix.

Other Members.

C. Barham, M.D., Cantab.,
Rev. J. Bannister, LL.D.,
Mr. W. Copeland Borlase, F.S.A.,
Rev. E. N. Dumbleton,
Rev. W. Iago,
Mr. A. Paull,
Mr. W. J. Rawlings,
Mr. H. O. Remfry,
Mr. E. Sharp, jun.,
Mr. W. Tweedy,

and The Mayor of Truro.

Local Secretaries. { *Bodmin*, Mr. T. Q. Couch.
Truro, Mr. Alexander Paull.

Mr. Whitley read the Lists of Presents:—

DONATIONS TO THE MUSEUM.

Five Specimens of Aberdeen Granite; Cairngall, Corrennie, Mull, Rubislaw, and Stirlinghill ..... Mr. Robert Sheriff, Glasgow.

Four Specimens of Perforated Limestone, from Torquay	Mr. G. F. Remfry, Truro.
Fibrous Gypsum, from Penarth. Scheifer Spar, from Botallack	Rev. Saltren Rogers.
Pitchblende, (Oxide of Uranium) from Russel District, Gilpin County, Colorado Territory*	Mr. Richard Pearce, F.G.S.
Bismuth, from Dolcoath Mine. Bismuthinite, from East Pool Mine Smaltite, ditto Wolfram, from Prospidnick Mine, Sithney Pyrites in Chlorite, ditto Foliated Chlorite, ditto Allophane, from Charlton, Kent	Mr. J. H. Collins, F.G.S.
Echinus lividus, dredged up off Portloe	Mr. G. W. Dix.
Fossils from Slate Rocks adjoining the Copper Lode of Knockmahon Mine, County of Waterford	Mr. James Webb.
A Sword, from Taku Forts, Pei ho River	Mrs. Dix.

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* In relation to this present, Mr. Henwood said: Many of us recollect the attempt to establish a Mining School in connexion with this Institution, and the admirable manner in which Mr. Pearce instructed his pupils in Chemistry. Every one foresaw that, sooner or later, he was certain of distinction; and this, I am happy to say, he has attained at a comparatively early age. Though no longer a resident in the neighbourhood, he still remembers us, and never omits an opportunity of affording us his valuable aid. During the past summer Mr. Pearce has been engaged in inspecting valuable mines of silver and gold in Colorado, one of the United States of America; and whilst there, he recognized amongst the rejected rubbish the ore of pitchblende—the Oxide of Uranium. The miners informed him that it occasioned them much inconvenience, without any advantage; and they were astonished to learn that it was worth, in this country, some hundreds of pounds (I believe Mr. Pearce says £400) per ton. A specimen of this ore, presented to us by Mr. Pearce, lies on the table. Pitchblende, though by no means an abundant ore in Cornwall, has long been known amongst us; the late Mr. Carne mentions it in his description of the mines of St. Just; and, from the immediate neighbourhood in which he found it, some little quantity has lately been sold. More than twenty years ago, several hundredweight of it were sold from the Providence Mines, near Saint Ives; but it realized no more than about £30 per ton. The almost adjoining mine of Wheal Trenwith had afforded some quantity of it more than thirty years since; and a somewhat remarkable occurrence brought it to light. A parcel of copper ore from that mine greatly disappointed the expectations of the miners, who thought they had a large proportion of valuable black copper ore. The smelter who bought it was disappointed, for the copper he extracted from it proved of inferior quality; and he sent a sample of this metal to my kind, esteemed, and excellent friend, the late Mr. John Michell, of Calenick, who detected a mixture of uranium. On ascertaining from what mine the ore was obtained, and having specimens of the ore sent him for inspection, he detected pitchblende in the ore of Wheal Trenwith. This incident is recorded in the fifth volume of the *Cornwall Geological Transactions*.

A Pile from a Crannoge discovered in 1869, in Llangorse Lake, Brecknockshire.....	Rev. E. N. Dumbleton.
A Lumpsucker	Mr. T. Cornish, Penzance.
Nest of the Esculent Swallow (Hirundo esculenta. Linn. and Gemil	Mr. W. P. Cocks.
Chrysalis of the *Saturnia Atlas*, Schr., *Bombyx Atlas*, Lat.; from China	
Argonauta Argo, Lam.; from the Mediterranean Sea	
Haliotis tuberculata, Lin.; from the Channel Islands	
Calyptræa Sinensis, Dish.; Helford flats ..	
Gorgonia verrucosa, Dr. Cole (young); Black Rock, Carrack Road	
Sertularia nigra, Pallas; Trawl refuse	
Asterina gibbosa, Penn; Rock pool, Gwyllyn Vase	
Purpura Lapillus, Lin.; *et Nidi;* Gwyllyn Vase.....	
Buccinum reticulatum, Lin.; *et Nidi;* Gwyllyn Vase	
Tobacco Pipe, with oysters, sessile barnacles, serpulæ, &c., attached; dredged in Carrack Road	
Penguin's Egg, from Ichaboe; found in guano, 60 feet below surface, 1847.....	
51 Coins, Counters, and Tokens (British and Foreign)	Major Vivian, Tregavethan.
9 Roman Brass Coins, found at Long Bridge, near Marazion, in 1793	Mr. Rogers, Penrose.
2 Nuremberg Counters,* found on taking down the Carminow Aisle of Mawgan Church; June, 1865.....	

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* Accompanying these was a note to Mr. Rogers from Mr. Albert Way, in which he writes: "I have received the MS. and the two pieces safely, and return you thanks for the account of so singular a discovery. The coins, which I return, are not coins, but Nuremberg Counters, of the innumerable types of pieces used until late in the xvi century for casting accounts on the 'Counter,' or ruled board, a term preserved universally, though scarcely ever understood. The two which you have sent are not of rare types. One exhibits a man at his Counting-board, at one end of which is his Account-book open; at the other, a bag of money. He is probably casting some very simple reckoning on his Abacus Table; and he did it quite as easily as with ciphers, such as we now use. On the other side of this piece is the Alphabet; and these Counters may have served to teach children their letters. They were usually in sets of 30. The Type, with many varieties, occurs not uncommonly: one figured by Snelling, in his Jetons, pl. 3, is very similar, but not the same as that before me. It is dated 1553.

The other is of the more common Nuremberg type, with the imperial orb, or mound of sovereignty, the Reichs Apfel, and the name of the maker: 'HANS SCHULTES ZU NUREMBERG;' the reverse has the usual device of crowns and fleurs de lys, and the legend: 'GLICK KVMPT VON GOT IST WAR.' * * * The types are very numerous, for these Counters were

7 Copper Tokens*..... 89 Brass Coins. 1666†	Mr. Rogers, Penrose.

CONTRIBUTIONS FOR THE ALBUM.

A Photographic Likeness of Mr. W. P. Cocks, of Falmouth.

Photograph (full size) of a Double-looped "Palstave," of brass, found in July 1871, at Penvores, near Helston‡.....	From Mr. J. Jope Rogers, Penrose.

ADDITIONS TO THE LIBRARY.

The London, Edinburgh, and Dublin Philosophical Magazine, and Journal of Science. Fourth Series. From No. 277, July, 1871, to No. 281, November, 1871.	From Mr. Henwood, President, 1871.

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struck in Germany with devices and heraldry suited to the country for which they were destined respectively. Neither of these pieces can be older than 1500-1550, and they have therefore no connexion with the entombed Carminows. It is curious that we never re-pew or restore or displace parts of old churches without finding some of these arithmetical appliances, which have slipped between the joists of the flooring or otherwise. I will not venture to infer that during dull sermons the wakeful parishoners made their reckonings of their gains during the previous week. But so it is."

* Of four of these, each has on its obverse a steam-engine and whim, with date, 1811, and legend: "Cornish Penny;" and on the reverse, a Fish, between blocks of Tin and Copper, with legend: "For the accommodation of the County."—A fifth is similar to the preceding, except that the legend on the reverse is: "Payable in cash notes at Scorrier House."—A sixth has on one side the words "Penny Piece," with encircling legend: "Success to the Cornish Mines," and date 1812. On the other side are the Dunstanville Arms.—The seventh has on its obverse the words "One Penny" and "Birmingham and Swansea;" and on the reverse: "Token 1811," and "Rose Copper Company."

† Each of these Coins bears on the obverse the name "ANTHONY COCKE" encircling three birds; and on the reverse: "OF REDRUTH, 1666." In 34 of the number the legend on the reverse encircles the letters A. C.; whilst in the remaining 55, the encircled letters are $_{A}{}^{C}{}_{M}$, and the birds are on a shield.

‡ In a note accompanying this present, Mr. Rogers writes: "I send, by book-post, a Photograph, full size, of a very fine brass celt, of the type now called a *Palstave*. It was found in July by an intelligent young man in my employ, on the farm of Penvores, Mawgan in Meneage, near Helston, three feet deep in clay. Its size is 5½ in. long; weight 14¼ oz., avoirdupois. Two-looped palstaves of this type are of the greatest rarity in England. In a recent number of the *Archæological Journal* (No. 108, pp. 230-237) two similar ones, though of slightly different figure, are given as found in Spain; and they have occurred in Portugal. Another is in the Museum of the Royal Irish Academy, and is figured in the Catalogue of that Museum, p. 382. Lord Talbot de Malahide possesses a second Irish specimen, figured in the *Archæological Journal*, vol. ix, p. 194. This was long considered unique. Mr. Albert Way tells me of two others, one found in Somerset, the other in possession of Rev. T. Hugo. This important find deserves to be recorded in your *Journal*. The Photo will perhaps find a place in your Scrap-book."

Mineral Statistics of Victoria, for the year 1870.....	From Mr. Henwood, President, 1871.
Reports of the Mining Surveyors and Registrars (Victoria.) For Quarter ending 31st March, 1871.	Ditto.
Ditto 30th June, 1871.	Ditto.
Address delivered at the Spring Meeting of the Royal Institution of Cornwall, on the 23rd of May, 1871. By William Jory Henwood, F.R.S., F.G.S.; Member of the Geological Society of France; sometime Her Majesty's Assay Master of Tin in the Duchy of Cornwall; President of the Institution..	Ditto.
A Handbook to the Mineralogy of Cornwall and Devon, with Instructions for their Discrimination, and Copious Tables of Localities; by J. H. Collins, F.G.S., Lecturer and Assistant Secretary of the Miners' Association of Cornwall and Devon; Secretary to the Royal Cornwall Polytechnic Society; Associate of the Royal Geological Society of Cornwall, and of the Royal Institution of Cornwall, &c., &c., *	Ditto.
Notice of John Knill, of Gray's Inn, 1733-1811.....	From Mr. Rogers, Penrose.
Glossary of Cornish Names, Ancient and Modern, Local, Family, Personal, &c.: 20,000 Celtic and other Names, now or formerly in use in Cornwall: with derivations and significations, for the most part conjectural, suggestive and tentative of many, and lists of unexplained names about which information is solicited. By the Rev. John Bannister, LL.D., Vicar of St. Day	From the Author.

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* Concerning this book, Mr. Henwood said: Amongst the books presented to us since our Spring Meeting, there is one which it would be almost criminal in me not to mention,—the Mineralogy of Cornwall and Devon by Mr. J. H. Collins, F.G.S., Secretary of the Royal Cornwall Polytechnic Society. It has been in my hand only a single day, and that day busily occupied by other matters; moreover, if I had more time, I may not perhaps have the knowledge necessary to offer a fair criticism of it, and, still more, time would not now permit it, if other conditions had been more favourable. So far as I have been able to judge, it contains a very great amount of most valuable detail, skilfully arranged and, after enormous labour, presented in a most lucid and easily accessible manner. If I may so far presume, I should without hesitation recommend it to every one desirous of acquainting himself with the mineral productions of the two counties; as, in my humble judgment, it reflects the highest credit on the Author. As a work printed within two or three hundred yards of this room, I hope I may be excused for remarking that Messrs. Heard may well pride themselves on this excellent production of their press.

The Western Chronicle of Science. Edited by J. H. Collins, F.G.S., &c., &c. Vol. I. Nos. 6-10, June — October, 1871	From the Editor.
On the Megalithic Remains in Mid-Kent. By E. Hadlow Wise Dunkin	From the Author.
Cardiff Free Library. An Address on the Delivery of the Annual Prizes to the Students of the Cardiff Schools of Science and Art, November 30, 1870, by G. T. Clark, Esq...	From Mr. F. T. Hudson.
Annual Report and Transactions of the Plymouth Institution and Devon and Cornwall Natural History Society. Vol. IV. Part II. 1870-71	From the Institution.
The Journal of the Royal Historical and Archæological Association of Ireland. Vol. I. ..... Fourth Series, April, 1871, No. 6..... Ditto, July, 1871, No. 7	From the Association.
The Journal of the Anthropological Institute of Great Britain and Ireland ..... Vol. I, No. 1, January—July, 1871 .... — No. 2, October, 1871	From the Institute.
Annual Report of the Board of Regents of the Smithsonian Institution, for the year 1869.....	From the Smithsonian Institution.
The Journal of the Liverpool Polytechnic Society, October 21, 1871	From the Society.
Transactions of the Geological Society of Glasgow. Vol. II, Part III, 1867 ..... Vol. III, Part I, 1868..... Vol. III, Part II, 1869 .... Vol. III, Supplement, 1871. On the Carboniferous Fossils of the West of Scotland	Ditto.
Proceedings of the Scientific Meetings of the Zoological Society of London, for the year 1871. Part I, January—March	Ditto.
Proceedings of the Society of Antiquaries of London. Second Series. Vol. V, No. 1, November 17 to December 8, 1870.....	Ditto.
Transactions of the London and Middlesex Archæological Society. Part XI, Part I of Volume IV., 1871.....	Ditto.
Collections of the Surrey Archæological Society. Vol. V, Part II, 1871.....	Ditto.
Report of the Proceedings of the Geological and Polytechnic Society of the West Riding of Yorkshire, 1869 ..... Ditto, ditto, 1870	Ditto.

Proceedings of the Philosophical Society of Glasgow. Vol. VII, No. I, 1868-69..... Vol. VII, No. II, 1869-70 ..... Vol. VII, No. III, 1870-71.....	From the Society.
Reports of the Cornwall Polytechnic Society, Vol. I, 1833-1838 ..... Vol. VII, 1866-1870	Ditto.
Proceedings of the Liverpool Naturalists' Field Club, for the year 1870-71	From the Club.

Books relating to Cornwall, presented by Mr. T. Q. Couch, Bodmin* :—

"God in the Creature" and other Poems. By Henry Grenfield. MDCLXXXVI. Dedicated to the Mayor, Recorder, and Justices of the Borough of Truro.†

Collections, illustrating the History of the Catholic Religion in the counties of Cornwall, Devon, Dorset, Somerset, Wilts, and Dorsetshire. In Two Parts, Historical and Biographical. With Notices of the Dominican, Benedictine, and Franciscan Orders in England. By the Very Rev. George Oliver, D.D., Canon of the Diocese of Plymouth.

A Letter to a Friend, containing some matters relating to the Church. By a Cornish Vicar, 1857.

Outline or Skeleton Maps of the Diocese of Exeter. Part I, containing, in thirteen plates, the Archdeaconry and County of Cornwall. 1825.

The Pirate, and other poems. By Frederick de Kruger, jun., Mariner. Dedicated to Vice-Admiral Sir C. V. Penrose, K.C.B., G.C. St. F. and M., and G.C. St. M. and G., of Ethy House, Cornwall.

The Truth of Christianity proved from ancient prophecies. By the Rev. Robert Walker, M.A. 1834.

Jeffery the Seaman, being a Narrative of his feelings and sufferings during his abode on the Desolate Island of Sombrero, where he was left by the inhuman order of his Captain. Together with a Journal or Diary during the eight days he remained there, interspersed with strictures and comments on the conduct of Captain Lake.‡

Miscellanies in Verse and Prose, English and Latin, by the late Anthony Champion, of the Middle Temple, Esquire. Published from the original manuscripts by William Henry, Lord Lyttelton. 1801.

The Works of Francis Gregor, of Trewarthenick, Esq. (A Presentation copy to the late Mr. Jonathan Couch, from Mr. Flindell, the publisher.)

Arena Cornubiæ: or, the Claims of the Commissioners of Woods and Forests to the Sea Coast and Banks of Tidal Rivers in Cornwall and Devon, examined and considered by J. W. Pycroft, Esq., F.S.A., M.R.A.S., Reg. Soc. Sept. Antiq. Hafniæ Socius, etc. 1856.

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* Presenting these books, Mr. Couch expresses his desire to aid, by further contributions, the formation of a good County Library in connection with this Institution.

† See *Journal of the Royal Institution of Cornwall*, No. XII, p. 316.

‡ See the History of Polperro, by the late Jonathan Couch, F.L.S., and Thomas Q. Couch, F.S.A., page 93.

The PRESIDENT, on retiring from the Chair, in favour of Mr. St. Aubyn, the President-Elect, said, he desired to offer in public, as he had done in private, his warmest acknowledgments to the Officers and Council with whom he had had the pleasure of acting, for the invaluable advice and assistance with which they had kindly favoured him; without which, indeed, he should have been quite unequal to the duties which it had been the pleasure of the members of this Institution to assign to him. And to the ladies and gentlemen who, at these meetings, had borne so patiently his many short-comings, and had looked rather to that which he wished, than to that only which he had been able, to perform, he presumed to offer his sincere and grateful thanks. To the end of his life he should remember that the highest honour he had ever received, had been in his native neighbourhood, and from friends who had known him from his youth.

Mr. ST. AUBYN said, when their Secretary communicated with him on the subject of the business of the day, he said something about the kind wish of the Council that he should undertake the duty of President; but he replied that it was his opinion that the duties of President would be much better filled by somebody possessing greater scientific attainments than he possessed, and he was in hopes they would have found some gentleman possessing those qualifications, and who would fill the office. He had added that if no better man could be found, and he was afraid from what had passed they had failed in that, he could only say that if it was their wish that he should accept the office, he should be most happy to do so. He could not be insensible of the great disadvantage that any person must labour under in succeeding Mr. Henwood, a man of European reputation, and who had reflected credit on that Institution by being its President for the last two years. For this it owed him a deep debt of gratitude, as well as for the services rendered.

At the close of the meeting, thanks were cordially voted to Mr. Henwood for the ability with which he had presided; and the EX-PRESIDENT in returning his warmest thanks for the courteous vote they had accorded him, said their approval was, to him, the highest of all possible rewards.

In the evening, a Conversazione was held in the new Lecture Room, and it was very numerously attended, especially by Ladies. Among the gentlemen present were:—Mr. J. St. Aubyn, M.P., President; Mr. W. J. Henwood, F.R.S., F.G.S., Ex-President; Dr. Jago, F.R.S., a Vice-President; Dr. Barham, Rev. J. R,

Cornish, Mr. T. Cornish (Penzance), Mr. W. G. Dix, Rev. E. N. Dumbleton, Mr. Heard, Capt. Henderson, Rev. W. Iago (Bodmin), Mr. H. Spry Leverton, Mr. A. P. Nix, Mr. A. Paull, Mr. J. R. Paull, Mr. W. J. Rawlings (Hayle), Mr. E. Sharp, jun., Mr. M. H. Smith, Mr. Tweedy, Capt. Veitch, R.E., Mr. Whitley, C.E., and Mr. R. N. Worth.

The special object of the meeting was to listen to descriptions of some of the characteristics of the district visited during the Autumn Excursion.

Mr. WHITLEY read a Paper descriptive of the physical geography of that locality, in the course of which he traced its geological history, and advanced arguments in support of his views with regard to the occurrence of drift in the western counties.

Captain HENDERSON read a very interesting Paper upon the famous Botallack mine, illustrating his descriptions by means of his admirable maps and sections of the sett and its workings. Mr. Henderson stated that he was under great obligation to the *West Briton* of the 24th of August last for much of the information which he had obtained respecting Botallack mine, and the workings thereon. From the account there given he made some interesting extracts. The mine was situated at and near the junction of the granite and killas, the latter being represented by rock of a very compact character. The granite had generally produced tin with a little copper; the killas large quantities of copper with some tin. In all, the ores of seven metals had been raised there; with perhaps a greater variety of minerals generally than in any other mine in Cornwall. The principal lode was called the Crowns, which was a guide or crosscourse. On it the famous Boscawen shaft, which extended under the sea, was situated; and at the junction with it of the other lodes the great mineral riches of the mine had been developed. The deepest levels of the under-sea part of the mine were so free from water that one hour's work a day with a bucket sufficed to keep them perfectly dry. In Wheal Cock, now a part of the Botallack sett, a miner had followed up the lode so near the sea that he drove his pick right through. The water rushed in, but he was not at all alarmed, and stopped the hole with a plug of wood, which, after fifty years, still remained. Botallack was divided into 200 shares, held by 84 adventurers, all resident in the county. It employed 700 hands, and had 156 heads of stamps (108 steam), and 14 steam engines. 40,000 tons of stuff were drawn to the surface every year, of which 27,000 were more or less available. Seven miles of levels and stopes were driven every year. In the quarter ending June last the expenditure was £8,212, and the

receipts £9,718. When the present company, about 36 years since, took on the mine it had only been worked to the 100-fathom level. The Button lode he said had already produced a clear profit of £24,000. He referred in a graphic manner to the immense perils miners underwent in the course of their operations underground, and pointed out that the Boscawen diagonal shaft was at an angle of 30 degrees, as steep as the roof of a house. When a breakage occurred there some years since no wire rope was in use, but a steel rope was afterwards introduced, and no mishap had occurred since. He was glad to learn that the Government was likely to undertake the inspection of metalliferous mines. He knew many ends that were being worked in this county where the miners were inhaling poison at every breath they drew, and where a candle would not burn within twenty feet of the spot where the men were working. He thought that there ought to be a limit to this kind of work. He had inspected a mine in the western district lately, where two young men, tempted by a very high price, were working in an end full of deadly gases, and the men were occasionally absolutely gasping for breath. He hoped the time was not far distant when every mine a hundred fathoms deep would be compelled to have a man-engine, which would conduce much towards the health of the miners. At Botallack the miners were spared the labour of ladders by the use of a skip.

Mr. T. Cornish, of Penzance, next read a Paper on the fishes of West Cornwall. Yarrell described 226 species of British fishes; Couch raised the number to 296. Of these upwards of 50 are fresh water; 20 others are littoral, and found everywhere on the coast. Of the remaining 218 species more than 150 have been found in the Mount's Bay district. Of these Mr. Cornish has with his own hands taken 101, from the mackerel midge to the basking shark, and has observed other 30. Several of the rarer kinds were described by Mr. Cornish, examples of some were shewn, and a fine specimen of the Lump Sucker fish was presented by him to the Institution.

The Rev. W. Iago, of Bodmin, one of the most zealous of Cornish antiquaries, gave a most interesting resumé of the antiquities visited during the excursion, illustrating his remarks by a number of excellent drawings. One of the most valuable points was a corrected reading of the *men scryfa.** In the course of his observations, Mr. Iago stated that all the Inscribed Stones in Cornwall, figured by Dr. Borlase, were still in existence, and

* For detailed description of this and other Inscribed Stones, see Rev. W. Iago's illustrated account in *R. I. Journal*, No. xiii.

more had been discovered since his day. One, recorded by him, as situate four miles east of Michell, had during many years been lost sight of, but had recently been re-discovered by Mr. Iago, and apparently in its original position. Mr. Iago also gave his rendering of an inscription, hitherto considered illegible, on the Inscribed Stone which had been used in the foundations of Phillack Church; and, further, exhibited and explained a drawing, he had made, of a mediæval carving in alabaster, discovered in the church at Mabe.

The length of the earlier papers prevented much discussion, but the proceedings altogether were of the most successful and enjoyable character.

We will close this account of the Conversazione with a description and illustration (by Rev. W. Iago) of the carved relic last referred to.

ALABASTER CARVING AT MABE.

Mr. Iago writes,—"This fragment, kindly shewn to me by the Vicar of Mabe, (the Rev. A. A. Vawdrey), was discovered with many others in a built-up Aumbry in the Chancel, during the restoration of the church. There are several subjects represented —this one shews the painful martyrdom of an early Bishop. His name has not yet been ascertained.—The figures around him are carved from the same block—all being in high relief (but rather unequally placed), gilded and colored. None of the eyes are closed—although at first some appear to be so, from the fact that the painted pupils have been rubbed off. An executioner, at one side, pours a black stream from a ladle, upon the Martyr's head; hot pitch or molten lead seems to be intended, as oil would have been tinted yellow; this renders it unlikely that St. John can be signified. Drops of the dark liquid appear on the Saint's body. A second tormentor holds him down with an instrument, or burns him, with its heated blade, upon the breast. Part of a third executioner is seen below—the remaining portion of him and of his weapon, which was thrust through or against the side of the cauldron, having been broken away. There was probably a fourth on the other side—most likely stirring the fire beneath the cauldron in which the Martyr stands; but the alabaster there no longer exists. Behind are bearded personages—A King, crowned, and robed in ermine, bearing a curved sword or scimitar —(perhaps to signify that the tortures of the victim were completed by decapitation). On his left stands a hooded monk-like figure holding what seems to be a roll or scroll. He may be meant for a heathen soothsayer or idolatrous priest, the King's ill-adviser —instigating the infliction of the sufferings.

Alabaster at Mabe, Cornwall.

The background, between the figures, is gilded. The mitre is of white and gold, but green within. The Saint's hair is golden; the King's hair and his companion's, black; the executioner's, red. The coats of these last are blue with gold border stripe. The exterior of the cauldron is red, the interior black. The instruments of torture have red handles, black bowl and blade. The countenance of the Martyr is perfectly placid. The visages of the torturers, distorted. In treatment and workmanship this group is very similar to that of the flaying of St. Bartholomew, also carved in alabaster, found some years ago in the Church of Lostwithiel. In costume and general design the figures also closely resemble those existing in the stained glass window of St. George's Martyrdom in St. Neot's Church; the saint there depicted, being, like this one, finally beheaded by the King's commandment—after passing through a scene thus labelled "*Hic ponitur in furno cum plumbo.*"

The dedication of Mabe Church is at present unknown. This carved group—or one of the others—may afford a clue. Hals suggested a derivation of the name; others give St. Mabe, but Dr. Oliver failed to trace out the Patron Saint. Mabe and Mylor (St. Melorus*, Martyr), were formerly one benefice. The nearest Sunday to St. Matthew's Day, Sept. 21, is the Parish Feast at Mabe, alias Lan-Mabe, La-Vabe, or Lavapper. These name-forms seem based on one like the following (1) Mabena, Maben (St. Mabyn)—figured in window at St. Neot's, with crown and palm-branch—daughter of King Brechan. (2) Mebered, Mewbredus (Patron Saint of Cardynham), also in ancient glass at St. Neot's, holding a head as emblem of decapitation, and thus invoked "*Sancte Meberede, oro pro nobis.*" (3) Vepa alias Vepus (in whose honor St. Veep church seems originally to have been dedicated). It is said that hot pitch was poured from ladles on St. Cyriac's head. (Callot, &c.). He was, however, a Deacon—not a Bishop as here shewn, (see *Butler*, Aug. 8); but another Cyriac alias Quiriacus was, it appears, Bishop of Jerusalem (Der Heyl: Leben) (N. and Q. 1871, viii, 268), and suffered under Julian the Apostate, being immersed in a cauldron of boiling oil, and finally, by the Tyrant's order, thrust through the back with a sword, (Comm: Oct. 28). Respecting Cyriac, Cyret, and Julitta, Dr. Whittaker made much confusion (C.C. i, 197-9). Dr. Oliver (Mon. D. Ex.) was surprised at his errors, and corrected them. St. Nicephorus, we are told, was tormented through holes in a tub.

W. Iago, B.A., (L.S. of the Society of Antiquaries, London).

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* *Journal of the Royal Institution of Cornwall*, Vol. 3, pp. 162-3.

Dr. Robert Tweedy in account with the Royal Institution of Cornwall. Cr.

1871.		£	s.	d.
July 31.	To Balance from last Account	107	15	8
	Annual Subscriptions.....	106	15	6
	Ditto H.R.H. the Prince of Wales	20	0	0
	Ditto Truro Town Council.....	20	0	0
	Visitors' Fees	2	16	6
	Sale of Journal and Reports.....	15	10	6
	Illustration Fund	8	5	0
		£281	3	2
1871.	Balance	£36	7	9

ROBERT TWEEDY, Treasurer.

1871.		£	s.	d.
July 31.	By Taxes and Fire Insurance	6	6	8
	Repairs	3	13	2
	Curator's Salary	44	0	0
	Museum Expenses	9	3	11
	Printing and Stationery.....	7	9	2
	Postages and Carriage of Parcels..	6	2	7
	Printing and Editing Journal and Report	58	13	8
	Illustrations for ditto.....	4	12	8
	Sundries	0	18	2
	Ray Society	1	1	0
	British Meteorological Society	1	0	0
	Royal Horticultural Society	2	2	0
	Quarterly Journal of Science	1	0	0
	Interest on Mortgage Debt	6	4	2
	Binding Books.....	3	17	0
	Altering and Furnishing New Room	88	10	9
	Loss by Excursion, 1870.....	0	0	6
	Balance.....	36	7	9
		£281	3	2

JOURNAL

OF THE

ROYAL INSTITUTION OF CORNWALL.

No. XIII. APRIL. 1872.

I.—*The Insulation of St. Michael's Mount, Cornwall.*

By W. Pengelly, F.R.S., F.G.S.

Read at the Spring Meeting, May 23, 1871.

THOUGH the "Mount" can never fail to be an object of great interest and of pride to Cornishmen, I might, in ordinary circumstances, have hesitated before venturing to make it the topic of a communication even to this Institution, seeing that I have already read three distinct papers on it to as many scientific societies—the British Association, at its meeting at Birmingham, in September, 1865; the Royal Institution of Great Britain, on April 5th, 1867; and the Devonshire Association, during its meeting at Barnstaple, in the following July.

The first was never printed by me or with my knowledge; but, as will presently be seen, a notice of it, and by no means a correct one, appeared in some newspaper. A full abstract of the second, prepared by myself, was printed in the *Proceedings* of the Royal Institution;* and the third was printed *in extenso*, in October, in the Transactions of the Devonshire Association.†

On November 25, 1867, Mr. Max Müller, the eminent Professor of Comparative Philology at Oxford, read to the Ashmolean Society a paper on "The Insulation of St. Michael's Mount,"

* *Proceedings Roy. Inst. Great Britain*, Vol. v, p. 128.
† Vol. iii, pp. 129-161, 1867.

which, during the present year, he has printed in his Third Volume of "Chips."* It was avowedly written to refute a conclusion to which the newspaper seems to have made me come and distinctly enunciate at Birmingham in 1865, but which, as is shown by the manuscript still in my possession, instead of advocating, I declared to be utterly untenable. The erroneous conclusion first ascribed to me by the newspaper, and then treated as mine by Professor Max Müller, was subsequently reiterated by a critic in the *Saturday Review*;† and, as it is well known to be difficult, if not impossible, to overtake a misrepresentation, there can be little doubt that it may again and again be given as an instance of the danger of hasty conclusions.

Such are the circumstances which have induced me to write this, my fourth, paper on *The Insulation of St. Michael's Mount.*

In order to a clear understanding of the precise point on which Professor Max Müller supposed himself to be at issue with me, it may be well at this stage to give a brief summary of my Birmingham paper, read in 1865. Having described the Mount and its position, I formally enunciated the following assumptions:—

1st—That the Old Cornish Name of the Mount was *Cara Clowse in Cowse.*

2nd—That the Name had been correctly translated as *The Hoar Rock in the Wood.*

3rd—That the Name was appropriate when it was first given.

4th—(On the authority of Dr. Boase‡ and Dr. T. F. Barham§)—That *Florence* of Worcester expressly stated that the Mount was formerly five or six miles from the sea, and enclosed with a very thick wood.

Though fully aware that each of these assumptions might turn out to be untrue, I supposed them to have at least a fair amount of evidence in their favour, and therefore came to the inevitable conclusion that the insulation of the Mount must have taken place after the introduction of the old British language into Cornwall.

No geologist can for a moment doubt that at a geologically very

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* *Chips from a German Workshop*, by F. Max Müller, M.A., Vol. iii, pp. 330-357, 1870.

† January 14th, 1871, p. 56.

‡ Trans. Roy. Geol. Soc. of Cornwall, Vol. ii, p. 134.

§ Ibid, Vol. iii, p. 105.

recent time the Mount was permanently a peninsula; or fail to see that its present insulation must be ascribed either to the mere wasting of the coast of the mainland by the action of the waves, or to a more or less general subsidence of the district, attended, perhaps, by such wasting. There is no other alternative. As it was the object of my paper to prove that the latter was the true cause, I proceeded first to show that the rival hypothesis—*insulation by encroachment without subsidence*—could not be entertained; having been led to this conclusion by a personal visit to the spot and a careful study of its physical geography and geology. It was obvious that though the cliff at Marazion—the nearest point of the mainland—was but little calculated to resist the unbroken action of the waves, it was so effectually protected by the Mount from the only quarter whence very destructive seas could be sent—from S.W. to S.E.—that its recession would in all probability be so slow as to be scarcely appreciable. This conclusion was fully confirmed by the evidence of all the inhabitants with whom I conversed, as they assured me that in their time there had been no wasting of the cliff. It cannot be doubted, however, that the Marazion plain did formerly extend further towards the Mount, and it may possibly have reached it in some very remote antiquity. The former was evident from the fact that the plain terminated, not in a slope, but in a low vertical cliff, consisting of a sub-aerial accumulation of clay and angular stones. The cliff, moreover, was partially protected by a wall: but, on the other hand, though the space between it and the houses was very narrow, the wall itself was so slender as to show that it was neither intended, nor expected to be called on, to resist powerful attempts at encroachment. In fact, it seemed to be a protection against sub-aerial agencies rather than against violent waves. Moreover, several parts of the cliff were entirely undefended, and these had by no means retreated, even to the extent of a single inch, more than those protected by the wall.*

* During a visit to Marazion since this paper was written, I observed the following fact, strongly confirmatory of the belief of the natives that if the cliffs recede at all they do so at a very slow rate. A house standing, it was said, on 60 feet by 60 feet, was in course of erection, *on a narrow tongue of the sub-aerial material*, having the sea-cliff no more than 12 feet from it on the west, and from 30 to 40 feet on the east. On my remarking that the site seemed a very precarious one, especially for so large and valuable a house, the workmen assured me that there was no risk whatever.

During the visit I encountered an intelligent native, who, though in his eighty-third year, was still active both in mind and in body, and who stated that within his recollection there had been no encroachment on any part of the cliff under the shelter of the Mount; but he added that at a short distance eastward "the sea had destroyed a great deal of land." On going with him to the spot, he pointed out an isolated rock on the tidal strand, which he said was so far in, and concealed by, the cliff when he was a boy of eight or ten years of age, that the portion of it which projected barely furnished him with a foothold from which, when bathing, he had frequently jumped into the sea at high water. From the data thus furnished I came to the conclusion that, where entirely unprotected by nature or art, the retrocession of the cliff had not exceeded twenty feet in seventy-five years; and that to suppose the Marazion cliff, from which the Mount cut off all destructive waves, had retreated at the average rate of ten feet in a century, would be to take a very high estimate. Taking this as a measure, and remembering that the distance from the mainland to the Mount is 1680 feet, it followed that the hypothesis of insulation by mere encroachment would require us to fix the date of the *insulation* at nearly seventeen thousand years ago. In other words, we should be at liberty to believe that about 150 centuries before the Christian era the permanent connexion of the Mount with the mainland was severed, but that immediately prior to that date it might have been a hoar rock *at the end* of a wood. To suppose it *in*, that is *surrounded by*, a wood, a further demand must be made on antiquity, such as would have sufficed for the wasting of the land from the sea-ward to the land-ward margin of the Mount. In short, on the assumptions laid down at the commencement, the hypothesis of insulation by mere encroachment appeared to demand the belief that at least twenty thousand years ago Cornwall was inhabited by a people who spoke a language which prevailed in the same district to within a very few centuries of our own time, and, from its similarity to the Welsh, might be said to be still spoken by a large population within our own island. Believing this conclusion respecting the antiquity of the old Cornish language to be totally untenable, I at once rejected it, and, with it, as a matter of course, the hypothesis of insulation by encroachment alone; remarking of the latter that it squandered time most lavishly.

Turning next to the hypothesis of insulation through subsidence—the only alternative consistent with the assumptions made at the beginning—I proceeded to show that there had been a general downward movement of the land in geologically very recent times, and, as evidence of it, described the submerged forests so prevalent on both the north and south coasts of Devon and Cornwall, especially noting the fine and well-known description which, in 1822, Dr. Boase gave of the example in the Mount's Bay.* I dwelt at some length on the fact that, whilst mere *encroachment* necessarily destroys and removes the land it wastes, *subsidence* may leave intact the soil it overwhelms; and, conversely, that when an old vegetable soil is found undisturbed beneath the sea, when the stumps of trees are found projecting vertically through and perpendicular to it, when roots and rootlets ramify from the trunks horizontally through the soil, when the plants are all of kinds still indigenous to the districts, and when such phenomena are met with in numerous localities throughout a wide area, there can be no doubt that there has been a general, tranquil, and in a geological sense, a very recent subsidence of the land.

Next, I pointed out that whilst, on the one hand, this change of level could not have taken place within the last 1,900 years, since, about 9 B.C., the Mount was described by Diodorus Siculus in terms which apply admirably to it at present; on the other hand, the vegetable and animal remains in the forests showed that it was what a geologist would call a very recent event. In short, the evidence then before us, was such as to compel the belief that the insulation of the Mount had taken place before the Christian era, but such also as to permit the belief that the event might have occurred not very long before that time.

The paper concluded thus:—"A careful consideration of all the facts of the case, as well as of the related phenomena, points decidedly to the conclusion that, since Cornwall was inhabited by a race speaking the British language, St. Michael's Mount was a 'hoar rock in a wood,' and that its insulation resulted from a general subsidence of the country."

* "Observations on the Submersion of part of the Mount's Bay; and on the Inundation of Marine Sand on the north coast of Cornwall." By Henry Boase, Esq., *Trans. Roy. Geol. Soc. of Cornwall*, vol. ii, p. 129, et. seq.

After reading the paper just sketched, I devoted a considerable amount of attention to the literature of the question, as well as to the physical phenomena in Devon and Cornwall to which it was related; and was enabled to state in the Royal Institution lecture, in 1867, that the tradition of the Mount having been five or six miles from the sea and enclosed in a very thick wood, was first mentioned, not, as I had been led to suppose from the writings of Dr. Boase and Dr. T. F. Barham, by *Florence* of Worcester, who died in A.D. 1118, and no where mentions the Mount, but by *William* of Worcester, who visited Cornwall about A.D. 1478, or 360 years further from the period to which the tradition pointed, thus rendering the tradition itself of little or no value; that the alleged old Cornish name assumed so many forms, and there was so much uncertainty about its exact import, as to render it improbable that it had any value as evidence; and that the submerged forest in Mount's Bay was known much earlier than I had supposed, as it was mentioned by Leland (1533–40), who also spoke of the similar forest in Torbay.

The printed abstract of this lecture, prepared by myself, closes with a *Recapitulation* containing the following passage:—"Nineteen centuries ago it" (the Mount) "possessed a safe harbour, so that its insulation must have been effected long before. It was at one time unquestionably 'a hoar rock in a wood,' but in all probability it had ceased to be so long before any language now known to scholars was spoken in the district. Prior to its insulation was the era of the growth of the forests now submerged along our entire sea-bord," &c.

In the paper read at Barnstaple, in July, 1867, I was able to make the following further corrections:—that the British name of the Mount was neither first mentioned by Carew in 1602, as was commonly believed, nor did it in its earliest known form contain any reference or allusion to a wood, since Norden mentioned it, probably in 1584, and Camden certainly in 1586, both giving it as *Careg Cowse*, which the first translated *Grey rock*, and the second *rupis cana*; that the name occurs in two different forms in Carew —*Cara Couz in Clowze* and *Cara-Clowse in Cowse*—each of which he translates in the same way—*The hoary rock in the wood*;—and that, as there was no Pope Gregory in the year 1070, there must be some error in the following statement made by William of Wor-

cester:—"Pope Gregory, in the year 1070," granted to "the Church in the Mount of St. Michael in Tumba in the county of Cornwall . . . . that all the faithful who enriched the Church with their benefactions and alms, or visited it, should be forgiven a third part of their penances." "These words," he continues, "were found in ancient registers lately discovered in this Church," and "they are publicly placed here on the doors of the Church."*

Returning now to the first of these papers—that read to the British Association, at Birmingham, in 1865—it will be remembered that the point of my argument was, that the hypothesis of the Insulation by mere encroachment could not be admitted, because it led to the conclusion that twenty thousand years ago the old British language was spoken in Cornwall, which was absurd. Unfortunately, the newspaper reporter, failing to see that I was using the *reductio ad absurdum*, with a delightful innocence, supposed, and informed the world, that I had contended for the twenty-thousand years antiquity of the Cornubo-British language. No one who reflects on the facts that scientific language is necessarily technical, and that newspaper reporters are rarely familiar with it, since it is seldom required in their profession, will be unprepared for errors of this kind; and every one who has watched newspaper reports of scientific papers or lectures must be acquainted with many examples of it.

The first intimation which reached me of the error in the newspaper report of my paper was through the Rev. Dr. Bannister of St. Day, Cornwall, who, being so good as to send to *Notes and Queries*† a reply to questions I had asked in its pages, concluded thus:—"I should like to ask Mr. Pengelly if he was correctly reported in the newspapers, which made him say at the Birmingham Congress that '20,000 years ago Cornwall was inhabited by a Cornish-speaking people.'" Thinking the matter of little or no public interest, I sent Dr. Bannister a private reply, containing the true state of the case.

The unfortunate newspaper report appears to have fallen into the hands of Prof. Max Müller, who, less cautious than Dr.

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* Itineraria.

† 3rd Series, Vol. xi, pp. 357-8. May 4, 1867.

Bannister, at once, and without question, accepted it as correct; as he says, "In his paper read before the British Association . . . . Mr. Pengelly adduced that very name" *(Cara clowse in cowse)* "as irrefragable evidence that Cornish, *i.e.*, a Celtic language, an Aryan language, was spoken in the extreme west of Europe about 20,000 years ago."* So startling a statement was undoubtedly calculated to rouse so eminent a philologer, and, accordingly, he set himself to work to demolish it, not, however, before he must have known that I had been incorrectly reported, or, if not, had recanted, for it is obvious that before writing his paper he had in his possession a copy of the authorized abstract of my Royal Institution lecture in April, 1867, since he avowedly quotes it, though not quite correctly, at the commencement of his paper. Indeed, he states that "In his more recent paper Mr. Pengelly has given up this position" (the 20,000 years antiquity of the Cornish language), "and he considers it improbable that any philologer could now give a trustworthy translation of a language spoken 20,000 years ago."† Notwithstanding this, however, he proceeds in his work of demolition, and, it must be confessed, with such eminent success as to render it impossible, if any one ever did hold the heresy, for him to do so again. For myself, I am heartily delighted to find that the conclusion which from the first I held to be utterly untenable, has been pronounced by the distinguished Oxford Professor to be one "which would completely revolutionize our received views as to the early history of language and the migrations of the Aryan race."‡

Instead of following the learned Professor step by step through his paper, it will be sufficient in this place to state, in passing, that he recognizes the Mount as the Iktis of Diodorus Siculus, remarking that it "was at last admitted even by the late Sir G. C. Lewis";§ accepts the charters of Edward the Confessor (1044),‖ and of Leofric Bishop of Exeter (1088);¶ declines the assertion of Sir Henry James that there are trees growing on the Mount in sufficient numbers to have justified the ancient descriptive

* Page 336.
† p. 336.
‡ p. 354.
§ p. 332.
‖ p. 343.
¶ p. 339.

name of the 'Hoar rock in the wood';* and addresses himself mainly to the following topics:—(1) The dense forest mentioned by William of Worcester as having at one time surrounded the Mount, (2) the alleged British name of the Mount, and (3) the translation of the said name. The results of his investigations on the last three points may be best given in his own words:—

"And here we find—

(1) That the legend of the dense forest by which the Mount was believed to have been surrounded existed, so far as we know, before the earliest occurrence of the Cornish name, and that it owes its origin entirely to a mistake which can be accounted for by documentary evidence. A legend told of Mont St. Michel "(in Normandy)" had been transferred *ipsissimis verbis* to St. Michael's Mount, and the Monks of that priory repeated the story which they found in their chronicle to all who came to visit their establishment in Cornwall. They told the name, among others, to William of Worcester, and to prevent any credulity on his part, they gave him chapter and verse from their chronicle, which he carefully jotted down in his diary."

"(2) We find that when the Cornish name first occurs it lends itself, in one form, to a very natural interpretation, which does not give the meaning of 'Hore rock in the wodd,' but shows the name *Cara cowz in clowze* to have been a literal rendering of the Latin name 'Mons in tumba,' originally the name of Mont St. Michel, but at an early date applied in charters to St. Michael's Mount."

"(3) We find that the second form of the Cornish name, viz., *cara clowse in cowze* may either be a merely metamorphic corruption of *cara cowz in clowze*, readily suggested and supported by the new meaning which it yielded of 'grey rock in the wood;' or, even if we accept it as an original name, that it would be no more than a name framed by the Cornish-speaking monks of the Mount, in order to embody the same spurious tradition which had given rise to the name of 'Hore rock in the wodd.'"†

The Critic in the *Saturday Review*, already mentioned, whilst looking on the Professor's "explanation as perfectly successful,"

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* pp. 331-2.

† pp. 355-6.

takes exception to his recognition of the Mount as the Iktis of Diodorus, and to his acceptance of the charters just spoken of: stating that "the Charter of Edward the Confessor referred to in p. 343 is quite impossible, and, if there be degrees in impossibility, those quoted in p. 339 are more impossible still. In them Bishop Leofric and Queen Matilda are made to sign charters some years after their deaths, and Leofric is made to act by authority of Gregory the Seventh, who did not become Pope until after Leofric was dead."* The question of the Mount and the Iktis will be noticed in the sequel.

The passages in Professor Max Müller's paper which have decided me to write once more on the subject, are the following:—Having referred to the notices of the submerged forest in Mount's Bay, by Borlase in 1757, Carew in 1602, and Leland (misprinted Lelant) in 1533-40, and having pointed out that the first "tells us that these forest trees were not found round the Mount, but midway between the piers of St. Michael's Mount and Penzance, that is to say, about one mile distant from the Mount,"† he thus proceeds:—"It is quite possible that the remains of trunks of trees may still be found on the very isthmus between the Mount and the mainland; but it is, to say the least, curious that, even in the absence of such stringent evidence, geologists should feel so confident that the Mount once stood on the mainland, and that exactly the same persuasion should have been shared by people long before the name of geology was known. There is a powerful spell in popular traditions, against which even men of science are not always proof, and it is just possible that if the tradition of the 'hoar rock in the wood' had not existed, no attempts would have been made to explain the causes that severed St. Michael's Mount from the mainland."‡

Again: "The only question which, in conclusion, I should like to address to geologists, is this. As geologists are obliged to leave it doubtful whether the insulation of St. Michael's Mount was due to the washing of the sea-shore, or to a general subsidence of the country, may it not have been due to neither of these causes,

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* *Sat. Rev.*, Jan. 14, 1871, p. 56.

† p. 334.

‡ p. 335.

and may not the Mount have always been that kind of half-island which it certainly was 2,000 years ago?"*

The spirit of the passages just quoted will, it is believed, be found in the following queries:—

I. If the tradition of the "hoar rock in the wood" had never existed, would geologists have ever entertained the idea that the Mount was once permanently a part of the mainland?

II. May not the Mount have always been that kind of half-island it is at present?

III. If at some early period it was severed from the mainland, have not geologists been obliged to leave it doubtful whether its insulation was due to the mere wasting of the sea-shore, or to a general subsidence of the country?

These queries I will now attempt to answer.†

I. It is, of course, not improbable that the tradition spoken of first called attention to the geological causes to which the present geographical character of the Mount was due; nor, on the other hand, is it impossible that the tradition may be a somewhat rudely philosophical interpretation of observed geological facts. The earliest mention of the tradition was that by William of Worcester, and was made in 1478, according to Dr. Oliver.‡ Leland, the next author who noticed the Mount, writing about fifty years after, mentions the tradition of loss of area—without, however, alluding to any supposed change in the geographical condition of the semi-island—and states, that "In the bay betwyxt the Mont and *Pensants* be found neere the lowe Water Marke Rootes of Trees yn dyvers Places as a token of the Grounde wasted;"§ and thus furnishes, whether he understood it or not, good geological evidence of subsidence and an early continental condition of the Mount. It cannot be denied that the tradition, as before hinted, may, perhaps, have

* pp. 356-7.

† A writer in the *Westminster Review*, in a brief notice of Prof. Müller's papers on Cornwall, says, "In the paper on the Insulation of St. Michael's Mount, we should have been glad to have heard something more of the geological evidence. We should also like to know what Mr. Pengelly . . . . may have to say in answer from that point of view. . . . . Many of the questions which Mr. Max Müller has raised can only be solved by the joint labours of the philologist and geologist."—*West. Rev.*, No. lxxvii., January 1871, pp. 277-8.

‡ *Monasticon.*

§ *Itinerary*, vol. vii., p. 118, 3 ed., Oxford, 1768.

had this submerged forest as its primary basis; but if it can be shown that the tradition is older than any knowledge of the forest, the fact will in no way detract from the value of the latter as evidence.

II. It is but fair to state that, Professor Max Müller makes no pretensions to geology, and that he does "not venture to touch the geological arguments."* It is not surprising therefore that the question he puts to Geologists, as such,—"May not the Mount have always been that kind of half-island which it certainly was 2,000 years ago?"—must be met with a clear and an unqualified "No." In order to a full appreciation of the grounds on which this answer rests, it will be necessary to give here a somewhat detailed account of the geology and geography of the Mount.

It is well known that the Mount is an island at every high water, and, with rare exceptions, a peninsula at every low water. Its distance from Marazion cliff—the nearest point of the mainland—to spring-tide high-water mark on its own strand is 1,680 feet, as Col. Sir Henry James kindly informs me. The tidal isthmus consists of the *outcrop* of highly inclined *Devonian* slate and associated rocks, and, in most cases, is covered with a thin layer of gravel or sand. At spring tides, in still weather, it is at high water twelve feet below, and at low water six feet above, the sea-level. In fine weather it is dry from four to five hours every tide; but occasionally, during very stormy weather and neap tides, it is impossible to cross for two or three days together. The Mount is an isolated mass of granite, measuring at its base about five furlongs in perimeter, as I am obligingly informed by Mr. J. P. St. Aubyn; and rising to the height of 195 feet above mean tide, according to Sir H. De la Beche.† At high water it plunges abruptly into the sea, except on the northern or landward side, where the granite comes into contact with the slate, into which it sends veins and dykes, as may be well seen on each side of the harbour. Here there is a small plain occupied by a village, adjacent to which is the harbour, built in 1726–7, and, as Mr. Johns, the harbour master, has been so good as to write me, capable of receiving ships of 500 tons burthen.

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* p. 356.

† See *Report on the Geology of Cornwall, &c.*, p. 15, 1839.

The country immediately behind, or north of Marazion, consists of Devonian strata traversed by traps and elvans, and attains an elevation of about 200 feet. The town stands on a small plain terminating in a cliff from twelve to twenty feet high. Judging from this cliff, the plain is a sub-aerial accumulation of fragments of rock derived from the adjacent hill, and embedded, without any approach to regularity of arrangement, in a yellowish clay, forming probably no more than from 30 to 40 per cent. of the entire mass.

The most important points in the foregoing description, in connexion with our present enquiry, are, 1st. The materials of the Mount. 2nd. The relative level of the isthmus and the sea.

1st. The Mount consists almost entirely of granite; a rock which all modern geologists hold to be of *Plutonic* or *Hypogene* origin: in other words, a rock which was not, and could not as such, have been formed at the surface of the earth, but was elaborated beneath an overlying mass of rock of some other kind, which was stripped off by subsequent denudation before any part of the granitic mass could have been exposed at the surface of the earth.

The thickness of this superincumbent mass it is probably impossible even to guess, but Mr. Sorby has, by a very refined method, estimated the pressure under which the St. Austell granite was formed as equivalent to 32,400 feet of rock vertically, that of the mean of the Cornish granite to 50,000 feet, and the granite of Ding Dong Mine near Penzance to 63,000 feet.* As this pressure was in all probability due to the expanding power of heat beneath or within the granitized mass, it is not necessary to suppose the overlying rocks, the function of which was *resistance*, had a thickness even distantly approaching these figures. Nevertheless, it must have been very great, and the denudation by which these rocks were removed must have been commensurate.

Should it be objected that, since its solidification, the granite has been thrust up through the rocks which formerly overlaid it, the veins and dykes which, as already stated, it has sent into the surrounding strata, will immediately furnish a conclusive reply in the negative. They can be seen extending in unbroken continuity

* See *Quart. Journ. Geol. Soc.*, London, Vol. xiv, p. 453, &c., 1859.

from the central mass into the beds they have invaded, and thus show that the latter have participated in every movement the granite may have undergone.

The geologist, therefore, so far from having the least doubt that there was a time when the Mount was not that kind of half-island which it is at present, cannot but recognize an era when it was completely and deeply encased, and the space between it and the lofty hill behind Marazion was filled, with a very different kind of rock.

2nd. We turn next to the relative level of the isthmus and the sea. From the description already given, it is obvious that if the district were raised 13 feet the isthmus would be constantly above the sea-level, and the Mount a permanent peninsula; whilst, on the other hand, if the district were lowered to the extent of but 7 feet the isthmus would always be under water, and the Mount for ever an island. To prove that the district was once at a greater height above the sea than it is at present, it is only necessary to appeal to the submerged forest long known in Mount's Bay. As has been already pointed out, such a forest is conclusive evidence of subsidence; and it is difficult to suppose that Leland—the first author who mentioned it—could have failed so to regard it.

Indeed, he tells us that "Ther hath been much land devourid betwixt *Pensandes* and *Mousehole*. Ther is an old Legend . . . . a Tounlet in this Part (now defaced and) lying under the Water."* In other words, a townlet or village, not destroyed by the mere encroachment of the waves, but permanently overwhelmed. We have already seen that he elsewhere mentions "as a token of the Grounde wasted" the occurrence of the "Rootes of Trees, in dyvers Places betwyxt the Mount and *Pensants*, near lowe Water Marke;" hence, even if the trees originally grew at the sea level, and even if there are none further sea-ward, the district must have been during the growth of the forest 18 feet higher than it is now—an elevation which must have kept the isthmus permanently dry, even if there had been no soil on it, and have deprived the Mount of its present semi-insular character.

The detailed description of this forest by Dr. Borlase, who carefully investigated it in January, 1757, confirms Leland's state-

* *Itinerary*, Vol. iii, p. 17.

ment, for he says that the portion of it which he examined was 300 yards below full tide mark, and at high water its *upper* surface had 12 feet of water on it.*

For the most minute description of it, however, we are indebted to Dr. Boase, who carefully studied it in the winter of 1825. From his account we learn that the trees were of hazel, alder, elm, and oak; that about a foot below the surface of the bed, the mass was chiefly composed of leaves and hazel nuts in a good state of preservation, the nuts, however, having lost their kernels; that in the bed were found fragments of insects, especially the elytra of beetles displaying the most beautiful colours; that the fishermen asserted that at low water the forest was traceable all the way to Newlyn pier, west of Penzance; that he was of opinion, from the material brought up by ships' anchors, that it extended sea-ward to, at least, Gwavas lake, the well-known roadstead; and that, having observed similar vegetable remains cast up among the pebbles at Lamorna Cove, four miles, in a straight line, S.S.W. from Penzance, he thought it very probable that a wood once covered the whole of the valley which now forms Mount's Bay.† In short, if Dr. Boase's opinion is even but partially correct—and we shall presently see that it is fully borne out by corresponding facts elsewhere—the Mount, during the forest era, must have been a "hoar rock *in* a wood;" and it may be repeated that it is possible that the tradition so frequently mentioned was primarily based on the only philosophical interpretation of which the submerged forest was capable.

We have seen, however, that Prof. Max Müller demurs to this argument; objecting that he has not been able to discover any proof of the presence of vegetable remains between the Mount and the mainland,‡ and that it is, to say the least, curious that, even in the absence of such stringent evidence, geologists should feel so confident that the Mount once stood on the mainland.§

The only aspect of the question in which this objection appears to me to have any force whatever, is that of supposing that the subsidence, unquestionably proved by the submergence of the

* *Natural History of Cornwall*, pp. 221-3.

† See *Trans. Roy. Geol. Soc. of Cornwall*, vol. iii, p. 166, &c.

‡ p. 334.

§ p. 335.

forest, was a mere local slip, in which neither the Mount nor its isthmus participated. To this aspect we will now give attention. We know that a forest of the kind extends continuously from about midway between the Mount and Penzance to Newlyn, and probably sea-ward at least to the well-known roadstead known as Gwavas Lake; that there are indications of another—if, indeed, it is *another*—as far west as Lamorna Cove; and that a third occurs at Porthleven, seven miles E.S.E. from the Mount;* hence, were there no further evidence of this kind, it seems impossible to conclude that the subsidence was so local as not to include the Mount. The evidence, however, is far from being so limited, for similar forests are known to exist on all the shores of all the British seas and channels. In 1829, Mr. Colenso, when describing in considerable detail the Stream-works at Pentuan in Mevagissey Bay, stated that at the top of the "tin ground," nearly fifty feet below spring-tide high water, stumps of trees, including oaks, were found having their roots in their natural position, and traceable to their smallest fibres even so deep as two feet;† and in the same year Mr. Henwood described the Carnon section on a branch of the Fal, and mentioned a vegetable bed containing moss, leaves, nuts, and remains of mammals, at a depth of nearly seventy feet below the high-water level.‡ It is well known that such forests present themselves at Millendreth, near Looe, in East Cornwall; and in the Lower St. Columb valley,§ as well as in Padstow harbour, in the north of the county. In Devonshire, too, they are equally well known, as they occur at Bovisand in Plymouth Sound, at Thurlestone Sands in Bigbury Bay, in Salcombe Harbour, at Blackpool near Dartmouth, in Torbay, and in Bideford Bay. They are met with also near Bridgewater and Porlock in Somersetshire, on several parts of the coast of Wales, on the coast of Cheshire, and near Hull. In short, it is difficult to say where they have not been seen.

Some of them are but rarely exposed to view. Thus, the Thurlestone example was seen and described in the spring of 1866, by the Rev. P. A. Ilbert, rector of the parish, who, though he had

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* *Trans. Roy. Geol. Soc. of Cornwall*, vol. i, p. 236.
† *Ibid*, vol. iv, p. 29, &c.
‡ *Ibid*, p. 57, &c.
§ See De la Beche's *Report on Cornwall, &c.*, p. 405, 1839.

resided there 25 years, and had interested himself in the local geology, had never previously seen or heard of it, though he had frequently noticed that lumps of what proved to be the forest clay were cast up by the waves, and had been much puzzled to account for them. There is a local tradition, however, that an old wood once stood on Thurlestone Sands; and this, in all probability, rests on no other foundation than the submerged forest thus very rarely exposed.*

Again, the splendid instance at Blackpool was seen in 1802 and in 1865, by persons who described it to me; but there is reason to believe that it remained completely buried beneath the sand during the entire interval. It was exposed again in February 1869.†

These forests have been described by so many observers that their literature is quite voluminous. Having devoted a large amount of attention to these descriptions, and having had opportunities of carefully studying the examples at Millendreth, Blackpool, Torbay, Bideford Bay, and the really magnificent one between the Mersey and the Dee, I am prepared to state that they uniformly present the same phenomena. They are everywhere composed exclusively of plants still indigenous to the several localities; the stumps of the trees rise vertically through, and at right angles to, the soil, in which the roots and rootlets ramify horizontally; and there is an entire absence of any indications of local slips.

With such a body of fact before us it may be safely concluded that they are the remains of forests *in situ;* that they were carried to their present level by a general, uniform, and tranquil subsidence of, at least, Western Europe, including the British archipelago—a subsidence, in fact, similar to that at present in progress in West Greenland,—in which we may feel confident St. Michael's Mount and its isthmus participated, the former being thereby converted into the half-island we now see it.

III. The answer to the third question has been already and obviously indicated, and need not be enlarged on. There may or may not have been some portion of soil on the isthmus, and this may or may not have been occupied by trees; but this, in either

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* See *Trans. Devon. Assoc.*, vol. i, pt. v, pp. 77-9, 1866.
† *Ibid*, vol. iii, pp. 127-9, 1869.

case, would in no way affect the conclusion arrived at:—The insulation was due, not to the mere wasting of the sea-shore, but to a general subsidence of the country.

Should the further question be asked, "What was the date of the submergence?" it must be admitted that at present no definite reply can be given. There are several facts, however,—such as certain statements and allusions in human history, the deposits overlying the forests in some localities, and the amplitude of the existing foreshore—which, on being considered, render it impossible to avoid the conclusion that the date was far removed from our own times.

I. According to Leland the Mount in 1533-40 was in the same condition as, and was no larger than, it is at present;* William of Worcester's *estimation*, in 1478, of the distance from the mainland to the Mount differs little from the distance now;† Bishop Lacy's encouragement to the faithful in 1425 to complete a causeway between Marazion and the Mount for the protection of life and shipping,‡ denotes that the exposure was as great then as it is in our day; and as the Confessor's charter in 1044 (assuming it to be trustworthy) describes the Mount as *juxta mare*—next or by the sea—it may be safely concluded that the insulation had taken place more than eight centuries ago.

The earliest known passage, however, supposed to be descriptive of the Mount, is the famous and oft-quoted one in Diodorus Siculus, about 9 B.C.,§ to the effect that the Britons who dwelt near the Land's End, by reason of their intercourse with merchants, were more civilized and courteous than the others were; that they were the people who dug the tin out of the ground, and cast it into square pieces like a die; that they carried it to a British island near at hand called Iktis, for at low tide all was dry between them and the island, and they conveyed over in carts an abundance of tin in the meantime; and that the merchants exported it thence to Gaul, through which they carried it on horses' backs to the mouth of the Rhone.

It is difficult to see how any one can fail to recognise the

* Op. cit. Vol. vii., p. 118.
† Op. cit.
‡ See Oliver's *Monasticon*, p. 28.
§ Bk. v., ch. ii.

Mount in this description. It occupies the position and possesses all the peculiar characteristics mentioned; it was capable, and must have been the only spot in the district that *was* capable, of affording the requisite shelter; it is in the very midst of the most productive tin country;* and besides it there is no other semi-island to which the author can be supposed to have referred. Nevertheless, many writers, so far from concurring in this view, have advocated the pretensions of other spots, such as one of the Scilly Isles, the Wolf Rock, the Black Rock at the entrance of Falmouth harbour, St. Nicholas or Drake's Island in Plymouth Sound, and even the Isle of Wight. Time will not allow me here to reply to the objections which have been urged against the Mount, nor to dispose of the numerous pretenders. Indeed, it cannot be necessary to do either, as little can be added to the well-known paper on the question by Dr. T. F. Barham.† It is, perhaps, worthy of remark, however, that those who have studied the Geology of Cornwall espouse the cause of the Mount, whilst most of those who fail to do so appear to have come to the question with their minds imbued with a belief in William of Worcester's statement that there were 140 parish churches submerged between the Mount and Scilly, and accordingly hold that the submergence took place, not only since the time of Diodorus, but since the introduction of the parochial system into Cornwall.

It has been already stated that Professor Max Müller holds the Mount to have been the Iktis, and that his admiring critic in the *Saturday Review* demurs to his doing so. The latter remarks, "We should like to know Professor Müller's authority for the statement that the identification of the Iktis of Diodorus with St. Michael's Mount 'was at last admitted even by the late Sir G. C. Lewis.' We are specially anxious on this point, as it was the argument of Sir George Lewis in the *Astronomy of the Ancients* which first convinced us that the Iktis of Diodorus was not St. Michael's Mount."‡ The so called *argument* of Sir G. C. Lewis is contained in the following passage:—"Timæus mentions an island of Mictis, within six days sail of Britain, which produced tin, and to which

* See Dr. Smith's *Cassiterides*, p. 114. 1863.

† See *Trans. Roy. Geol. Soc. of Cornwall*, vol. iii, p. 86, *et seq*, 1825. Also *Trans. Devon. Assoc.*, vol. ii, pp. 142-55. 1867.

‡ p. 56.

the natives of Britain sailed in coracles. The Mictis of Timæus and the Ictis of Diodorus are probably variations of the name Vectis, by which the Roman writers designated the Isle of Wight."*

It would not have occured to me to have spoken of this passage as containing an *argument*, or, indeed, anything more than a *suggestion*. Be this as it may, the passage has been generally, and perhaps not unreasonably, understood to express its author's belief that the Iktis was the Isle of Wight. It does not appear to be so well known as could be wished, that in 1862, Col. Sir Henry James called the attention of Sir G. C. Lewis to the sense in which his words were understood, as well as to the views of Dr. T. F. Barham respecting the Iktis and the Mount, as set forth in the paper already mentioned; and that his reply, dated June 16th, 1862, contained the following statement: "The passage in my volume was not intended to convey the meaning which you attributed to it. All that I meant to say was, that the *names* Mictis and Ictis were variations of Vectis, and arose from a confusion of that name. My impression was that both accounts were fabulous, and arose from the tendency to multiply islands . . . . The coincidence of the account of Diodorus with St. Michael's Mount is, however, so close, that it cannot be accidental, and the circumstances mentioned by Dr. Barham, satisfy me that it was the port from which the tin was shipped for the coast of Gaul."†

Though, as we see, the author of the *Astronomy of the Ancients* never entertained the idea that the Iktis was the Isle of Wight, that idea has been, and still is, held by many; but on what grounds it is difficult to see, except, perhaps, the comparative proximity of the island to the continent. To suppose the Cornubians took their tin by land to the Hampshire coast, is to suppose the existence of bridges and good roads, and such an absence of enmity between the British tribes, as to imply a comparatively high civilization, utterly incompatible with the indirect statement of Diodorus to the contrary. The reason assigned by the old Sicilian

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* *An Historical Survey of the Astronomy of the Ancients.* By the Right Hon. Sir George Cornewall Lewis, p. 453. 1862.

† The entire Letter from Sir G. C. Lewis to Sir H. James was printed in the Forty-fifth *Annual Report of the Royal Institution of Cornwall*, 1863, pp. 34-5, at the request of the latter, in the belief that it would "prevent future writers from quoting the high authority of Sir George Lewis to any contrary opinion."

for the superior civilization and courtesy of the dwellers near the Land's End, was their intercourse with merchants—an advantage which must have been enjoyed by the Vectians in a much higher degree than by the Cornubians, if the Iktis were on the coast of Hampshire, instead of that of Cornwall. Moreover, there is no reason to believe that in the time of Diodorus the Isle of Wight was a peninsula at low water. What evidence there is on the point, is decidedly in the opposite direction. Thus, Bede, who died in 735, calls attention to the same remarkable tidal phenomena in the Solent by which it is at present characterised.* The accounts which have reached us of its conquest by Vespasian in 43 A.D. do not so represent it; and it is noteworthy that in the earliest traditions respecting the spot it is regarded as an island: Thus, the following is the sixty-seventh of the *Historical Triads of Britain*:—"The three primary islands attached to the Isle of Britain—Orkney, Man, and Wight. At a subsequent period the sea broke through the land, and Anglesea became an island; and in a similar manner the Orkney Isle was broken, and many islands were formed in consequence, and other parts of Scotland and Cambria became islands."† Without insisting on the historical value of the *Triads*, attention may be called to the fact that a tradition, which ventures back to a time when Anglesea was part of the mainland and the Orkneys were one and undivided, recognizes the earliest condition of the Wight as that of an island.

Nor are we without evidence that the relative level of sea and land in other parts of Britain has remained unchanged from the earliest times of history. Mr. Whitley informs me that whilst he found the old Roman embankment at the Wash, from two to four miles inside the outer fringe of the Marsh lands, from the gathering of warp on the outside; it is on the same level as the new embankment built outside to exclude the tide. He properly regards this as strong evidence that no change in the level of the land has taken place since the Roman occupation.‡

Again, every reader of Scott's *Marmion* will no doubt re-

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* *Ecclesiastical History*, Bk. iv, Ch. 16.

† See *Notes and Queries*, 4th S. vol. iii, p. 23, January 2, 1869.

‡ Private letter, August 6, 1867.

member the following description of Lindisfarne, or Holy Island, on the coast of Northumberland :—

> "The tide now did its flood-mark gain,
> And girdled in the Saint's domain:
> For, with the flow and ebb, its style
> Varies from continent to isle;
> Dry shod, o'er sands, twice every day,
> The pilgrims to the shrine find way;
> Twice every day the waves efface
> Of staves and sandalled feet the trace.
>
> *Canto II., Stanza* 9.

This description appears to have been as appropriate in the seventh Century as in the present day, for Bede states that in 635 A.D. the elders of the Scots sent Aidan to be bishop of Northumberland, at the request of the pious King Oswald; and that "the King appointed him his episcopal see in the isle of Lindisfarne, as he desired. Which place, as the tide flows and ebbs twice a day, is enclosed by the waves of the sea like an island; and again, twice in the day, when the shore is left dry, becomes contiguous to the land.*

When it is remembered that Bede was born in the year 673, on the coast between the Tyne and Wear, almost within sight of Lindisfarne; that he spent his entire life from seven years of age in the abbeys of Wearmouth, and of Jarrow on the Tyne, where he died in 735; that he was an ecclesiastic and a writer of ecclesiastical history; and that all the churches from the Tyne to the Tweed, and many of those from the Tyne to the Humber, had their beginning from the Monastery in Holy Island, it cannot be doubted that he had every opportunity and motive to make himself perfectly acquainted with the history and condition of a spot which he must have held sacred. We may safely conclude, then, that there has been no change of relative level of sea and land on the coast of Northumberland during the last thirteen centuries; and that Bede was not aware of any tradition of a different condition of the Holy Island.

II. Though it is not possible in many cases to ascertain the thickness of the materials deposited on the ancient forests so frequently mentioned, thanks to the careful observations which have

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* *Ecclesiastical History.* B. iii., Ch. 3. (Bohn's Ed.)

been made and recorded respecting the stream tin works in Cornwall, we have information on the question of a most trustworthy character, and well calculated to impress the mind with the vastness of the time which has elapsed since the subsidence. Thus, at Carnon, Mr. Henwood found the vegetable bed resting on the "tin-ground," and lying beneath a series of distinct beds of sand and silt, having a total thickness of more than 43 feet, and all of them, with the exception of the uppermost bed of river sand and mud, three feet in thickness, containing marine shells.*

Again, Mr. Colenso found at Pentuan the old forest rooted in the "tin-ground," and overlaid with detrital matter 64 feet in aggregate thickness. This accumulation, too, was made up of distinct beds of sand, silt, and vegetable matter; every portion of which had been deposited since the subsidence, for an oyster bed was found on the top of the "tin-gronnd," the shells being still fastened to some of the large stones and *the stumps of the trees.*†

When it is remembered that beds of sedimentary origin, like those just mentioned, can no more be deposited at a rate exceeding that at which the pre-existing rocks are abraded, than a wall can, on the whole, be built faster than the stones are quarried or the clay is dug for making the bricks, it will be felt to be impossible to regard the strata under consideration as representing a few centuries merely; and, though we are not, and never may be, able to evaluate them in years, we cannot but feel that they bring us face to face with an enormous amount of time.

Should it be objected that a deposit of great thickness may, by a change in the direction or velocity of a stream, be removed from one place to another and re-deposited in a comparatively short time, it may be replied that the objection is in itself undoubtedly valid, but that it does not, and cannot, apply to the cases before us, as, in each, the successive beds were perfectly distinct and of dissimilar materials, and, at all levels, contained marine shells, which, and particularly the flat ones, Mr. Colenso states were frequently found in rows or layers. They were often double and closed, with their opening part upwards, as if the fish had lived and died where their remains were found.‡

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* *Trans. Roy. Geol. Soc. of Cornwall*, Vol. iv., p. 57, *et. seq.*, 1829.
† Ibid, p. 29, *et seq.*
‡ Op. cit.

III. We have seen that the entire country, prior to the subsidence, stood at least 70 feet higher than at present; consequently the cliffs now assailed by the waves during storms at spring-tide high-water, were then at some distance beyond their reach, or, more correctly, they have been formed by wave action on sites to which the breakers then had no access; whilst the rocks and shoals on which the waves then broke at spring-tide low-water, are now in the quiet depths of the sea. Hence the breadth of the existing foreshore—that is, the entire distance between the line of breakers in the most tempestuous weather at the lowest retreat of the tide, and the cliffs which the waves attack in similar weather at the high water of spring tides—may be taken as the space over which the cliffs have slowly retreated, inch by inch, since the last adjustment of the relative level of sea and land.

It cannot be necessary to remark that this amplitude of the existing foreshore differs much in different districts, for it depends on the materials of which the rocks consist, their structure, the aspect of their exposure, and the prevalent winds. Though the coast from the Prawle to the Start in South Devon is undoubtedly exposed to the almost unchecked fury of the waves sent up channel from the Atlantic, yet, when it is remembered that the rocks of that district are crystalline schists, than which none probably are more capable of resistance, it will be seen that the fact that even they have so far retreated since the submergence of the forests as to form a foreshore fully a quarter of a mile in breath, is one which, to the man of science, betokens that the era of the subsidence must have been in remote pre-Christian times.

Remote, however, as was this era when measured by the units employed in human history, it must have been very modern as a geological event, for, as we have already seen, the plants of which the forests consist are, not only recent species, but such as are still indigenous in the several localities; hence the period of their *growth*—a period necessarily more ancient than that of their *submergence*—fails to take us back to the times of extinct vegetation, or to a climate differing much, if at all, from that which at present obtains.

It must be borne in mind, however, that this by no means proves that the *animals* of the period and districts have undergone no change, for, to say nothing of the influence of man in the

extermination of at least the larger animals, it is well known that extinction did not result from convulsion, catastrophe, or sudden change; and that lowly organized species are, as a whole, much less affected by changes in external conditions than are those of complex organization. Hence, the value of what may be called the *Life of a Species* is by no means a constant quantity; and there can be no *à priori* reason why, though the forests were composed of such plants as now exist in the same localities, the animals which found food and shelter in them may not have been, at least in some instances, extinct species. Indeed, an examination of the ossiferous contents of the forests proves that this was the fact, for, to go no further, there have been found in the Torbay forest remains of the red deer *(Cervus elaphus)*, wild hog *(Sus scrofa)*, horse *(Equus caballus)* long-fronted ox *(Bos longifrons)*, and mammoth *(Elephas primigenius)*—the last, if not the last two, being certainly extinct. The evidence of the mammoth is a fine, adult, left, lower molar, dredged out of the peaty mass where there is never less than 30 feet of water.

Remains of the same species were also discovered in 1849, in the submerged forest at Holyhead.*

Though the era of the submergence was, as we have seen, certainly some thousands of years before our time, those who have kept themselves acquainted with the recent progress of Anthropology, will be prepared to hear that it took place since the advent of man in Britain. As long ago as 1829, Mr. Henwood recorded the discovery of human skulls in the forest at Carnon,† and in 1852 an antler of a red deer, fashioned into a tool, was found nine feet deep in the Torbay forest, and at the same depth below spring-tide highwater.‡

The connexion of the forests, however, with the Antiquity of Man by no means ends here. They, ancient as they undoubtedly are, must be very modern in comparison with the men whose tools have been found in Windmill Cavern at Brixham, and Kent's Cavern at Torquay. The entrances of these Caverns are in the sides of lime-stone hills, at a height 100 feet in the first case,

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* Lyell's *Principles of Geology*, 10 Ed., Vol. I., p. 545. 1867.

† Op. cit.

‡ See *Trans. Devon Assoc.*, Vol. i, pt. iv, pp. 36-38. 1865.

and from 60 to 70 in the second, above the bottom of the adjacent valleys in the same vertical plane; and the implement-bearing deposits which they contain were carried into them when the bottom of the valleys was very little below the entrances. In other words, since the existence of Man in Devonshire, the Brixham Valley has been deepened, by excavation or re-excavation, as the case may be, to the amount of at least 100 feet; and the Ilsham Vale, adjacent to Kent's Hole, to the extent of upwards of 60 feet. But as the bottom of the former, so far as it is known, is not the limestone of the district, nor, in the ordinary meaning of the term, *rock* of any kind, but an undoubted portion of the submerged forest of Torbay, it is obvious that the time expended in excavating the valley below the level of the cavern, fills but a part of the interval which separates the era of the Cave Men of Devonshire from the present day. In order to obtain the whole, we must add to this part the time represented by the lodgement of the blue forest clay of Devon, or the tin-ground of Cornwall; to this again must be added the period in which the forests grew; to this a further addition must be made of the time during which the entire country was carried down at least 70 feet vertically, by a subsidence so slow, and tranquil, and uniform that it no where, throughout the area of Western Europe and the British Islands, disturbed the horizontality of the old forest soil; and, finally, we must also add the time which has elapsed since—a time which, of itself, thanks to the description of St. Michael's Mount by Diodorus Siculus, we know certainly exceeded 2,000 years, and which the volume of the stratified deposits overlying the forests, as well as the amplitude of the existing foreshore, warrants our believing exceeded it by a very large amount.

To me, the Insulation of St. Michael's Mount in Cornwall has its chiefest interest in this connexion. It is the first, or most modern, of a series of trustworthy stepping-stones leading backwards towards the far reaching Antiquity of the Human Race.

II.—*Poll Tax Account for the County of Cornwall, 51st Edward III, A.D. 1377, with remarks thereon by* Sir John Maclean, F.S.A., *Honorary Member of the Royal Institution of Cornwall.*

Read at the Spring Meeting, May 23, 1871.

UNTIL the beginning of the present Century no regular system of numbering the people was adopted in this Country.* In mediæval times the most profound ignorance existed upon statistical subjects, so profound that when in the forty-fifth year of King Edward III. it was found necessary to grant the King a subsidy of £50,000 it was directed to be collected by an assessment of 22s. 3d. upon every parish, on a presumption that the parishes in England amounted to 45,000, whereas they were hardly a fifth of that number; and this amazing mistake was not discovered until after the parliament had been dissolved.† Even at the end of the 18th Century a controversy of some duration had existed as to the increase or diminution of the population, and in the year 1800 an Act of Parliament was passed "for taking an account of the population of Great Britain, and of the increase or diminution thereof." This was carried into effect in March, 1801, in so far as it regarded the enumeration of houses, families, and persons. This Census forms the basis of our Population Returns, and the process having been repeated at the seven subsequent decennial periods (the eighth enumeration having recently taken place) affords us the means of comparison of the extent of the growth of the population

* In America and France enumerations were made a few years earlier. In the former Country in 1790, and in the latter the following year.

We are aware of the table given by Davies Gilbert in which is shewn the population of the County in 1700 and 1750. The authority for it was unknown, however, to that Author, and until the numbers shall have been authenticated, they cannot be relied upon. (*Vide Hist. Cornw.*, Appx. ii, Vol. iv, p. 178).

† *Hallam's Middle Ages*, Vol. ii, 179.

during each term, and of estimating its effect upon the national resources during the period of seventy years.*

It has frequently been lamented by statisticians that we have no earlier data from which to draw deductions. Such is the case as regards direct information, but a document which we have recently found in the Public Record Office affords, so far as the County of Cornwall is concerned, the means of ascertaining, with close approximation to the truth, what was the number of the people, as well of the entire County and of each of the Hundreds, as also of each Parish in most of the latter, in the year 1377. This is an account of a Poll Tax† which was granted in the 51st Edward III, for the maintenance of the war with France and for the defence of the realm. It was assessed at four pence for every lay person, both male and female, exceeding the age of fourteen years, non-fraudulent beggars only excepted. Certain persons were appointed Collectors for the whole kingdom, who appointed the Constables of every parish, or two honest parishioners, to collect the tax and return the amount to them by Indenture‡ upon oath,

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* It was hoped when this paper was written that before it was printed the result of the Census of 1871 would have been arrived at, in which case the numbers and computations would have been based thereon. We regret to say, however, that at the time of going to press the enumeration for Cornwall has not been completed.

† A Poll Tax was never popular, and was resorted to in cases of urgency only. This is the earliest of which we have any knowledge. A similar one was granted five years afterwards (4 Rich. II), which imposed a payment of three groats upon every male and female above 15 years of age, beggars excepted. It was found so oppressive upon the poor that it met with considerable resistance, and was obliged to be modified, and in some measure graduated according to the means of the people. A rich man was not to pay more than 60 groats for himself and his wife, and a poor man not to pay less than one groat; labourers and servants to pay according to their circumstances. (Rolls of Parl. iii, 90[a]).

As late as the year 1641, upon the assembling of what is called "the Long Parliament," an Act was passed for levying a Poll Tax for the purpose of paying off and disbanding the armies. Curiously enough this was based upon the same principle which governed that of 4th Rich. II, to which reference was made in the proceedings. Graduated rates were fixed, extending, in great detail, to all ranks and conditions of men. It was enacted that a Duke should pay £100, a Marquis £80, and so on down to 5s. "for any one who can dispend £20 a year."—All other persons above 16, such as receive alms only excepted, 6d. a head. Recusants double in all. (*Parl. History*, Vol. ix, p. 376).

‡ Many of these Indentures continue in existence, as we shall presently see; some, it is true, in a very faded condition, others as bright and clear as when written, and all have their seals appended. We give one as a specimen:

shewing the number of persons chargeable and the amount received in each parish. By adding to the number thus given the approximate number of persons of and below the age of 14 years, which, according to statistical experience and calculation, should exist,* we arrive at the aggregate number of the population within the district.

Notwithstanding that this record does not enter into detail of the nature of the employment of the several persons or their social condition, and is deficient of much valuable information contained in the modern Census Returns, it is, we think, a document of great curiosity and of no small interest, especially in this Census year. It relates, however, to the *laity* only. The Clergy, doubtless, otherwise paid their quota of the sum required, but the Clerical Subsidy Returns for this period are not in existence—The number of Clerics in the County, however, at the date in question must have been comparatively small, and, taken together with the beggars, would produce no appreciable effect upon the aggregate population.

On the day on which the Census was taken in 1861 the total population of Cornwall, exclusive of the Scilly Islands, was 366,959, and upon the basis of the whole population of England the proportion of children under 14 years of age to the total number is ·3348. This will give the population in Cornwall under 14 as 122,858, and the number aged 14 and upwards as 244,101 = 366,959. In 1377 the population of the County (exclusive of Clergymen and beggars) exceeding 14 years of age was 34,274, as shewn by the Poll Tax Account, and, assuming the birth rate at that date not to have differed much from that of 1861, we should, for children under 14 years of age, add thereto 17,137, making the total population of the County in 1377 51,411. In 1801 the number of people in the County was 189,278, but no record has been preserved of their relative ages.

Hec indentura testatur quod Herveus Treuaswithen et socii collectores cujusdam subsidii quatuor denariorum Domino Regi concessi in parliamento suo in xv° Sancti Hillarii anno regni Regis Edwardi Tertij a conquestu angliæ Lj^mo recesserunt et habuerunt de Waltero Carnsuyou et Waltero Banadlek subcollectoribus subsidii predicti de parochia Sancti Landy in hundredo de Kerrier per sacramenta sua de lxix hominibus et feminis laicis excedentibus etatem quatuordecim annorum de eadem parochia xxiij solidos. Datum apud Penryn die Lune proximo post festum Sancti Marci anno supradicto.

* The proportion of children under 14 years of age to persons 14 and upwards is ·5003.

In the comparison of these numbers we find that in the whole period of 484 years from 1377 to 1861 the increase in the population in Cornwall was 613·777 per cent. In the period of 424 years from 1377 to 1801 the increase was 268·166 per cent.; being an average increase of 6·355 per cent. for each period of ten years; and for the period of sixty years between 1801 and 1861, the increase was 93·873 per cent. or an average of 15·646 per cent. for each decennial period; whilst the corresponding increase during the same period for the whole of England was 15·333 per cent. It will thus be seen that up to 1861 the growth of the population in Cornwall had exceeded the average ratio, but it is apprehended that upon making up the Returns of the Census just taken it will be found that, from various causes chiefly local, the increase has been changed into a loss.

The following table will shew the distribution of the population into Hundreds at the three dates to which our enquiry extends:

Name of Hundred.	1377.	1801.	1861.	
West	7,117	12,931	24,367	
East	8,776	24,445	47,689	
Trigg	3,678	8,764	14,531	
Lesnewth	3,060	5,654	8,151	
Stratton.....	2,186	6,257	7,787	
Powder	9,029	36,434	71,361	
Pyder.....	5,966	16,625	27,978	
Penwith.....	6,689	43,226	102,963	exclusive of the Scilly Islands.
Kerrier	4,910	34,942	62,132	
	51,411	189,278	366,959	

Of these nine Hundreds, to the Poll Tax Account are annexed the files of Indentures, more or less complete, relating to six, from which we have compiled the Schedules marked from A to F., and upon these it seems desirable to offer a few brief remarks.

Hundred of West. Schedule A $\frac{87}{30}$.

Of the twenty-four indentures mentioned in the Account twenty-two are found upon the file. The parishes for which they are wanting are St. Cleer and St. Neot. The number of persons assessed to the Poll Tax in these two parishes was 700, and con-

sequently the aggregate population must have been about 1050. It should be noticed, however, that the separate assessment of the Manor of Liskeard, from our want of knowledge of its extent at the date in question, in some measure disturbs the accuracy of the parochial comparisons: and the same remark will apply to the other schedules in which separate manorial assessments occur.

Hundred of East. Schedule B. $\frac{87}{34}$.

The assessment of this Hundred was returned upon twenty-nine Indentures, of which twenty-eight remain upon the file. These, however, leave the present parishes of Callington, St. Dominic, Laneast, St. Thomas, Tremayne, Tresmeer, Trewen, Rame, and St. Stephens by Saltash unaccounted for. Some of these: *e.g.* St. Stephens by Saltash (if not taxed under the town) was probably included in the great Lordship of Trematon, and most of the others, if they existed at the time, were chapelries pertaining to other parishes: *e.g.* Callington to Southill, Tremayne to Egloskerry, and Trewen to South Petherwin. We find, however, that the Churches of St. Dominic and Rame were separately taxed in Pope Nicholas's Valuation of 1288 to 1291. The parish or place to which the missing Indenture related must have had an assessable population of 84, and, consequently, the aggregate number of inhabitants was 126. The ink upon the Indentures pertaining to this Hundred has become so very faint that it was with the greatest difficulty we could decipher the writing.

Hundred of Trigg.

We regret to say that the indentures relating to this Hundred are wholly lost.

Hundred of Lesnewith. Schedule C. $\frac{87}{31}$.

The full number of nineteen indentures is found on the file pertaining to this Hundred. One of them, however, (No. 15) is not Cornish, and has been placed upon the file in error. Upon No. 18, the name of the parish is wholly illegible, though we have deciphered the number of persons taxed. The three parishes which cannot be identified are Advent, Lanteglos, and Forrabury. The towns of Tintagel and Botreaux Castle were separately taxed. Under the latter, probably, was included Forrabury and part of

Minster. The missing indenture, which it is likely related to Lanteglos and Advent, must have contained 125 taxable persons, and the population of the parish would have been 186, which we have accordingly inserted.

Hundred of Stratton. Schedule D. $\frac{8}{2}\frac{7}{5}$.

The thirteen indentures relating to this Hundred are complete.

Hundreds of Powder and Pyder.

The indentures for these Hundreds are wanting.

Hundred of Penwith. Schedule E. $\frac{8}{3}\frac{7}{3}$.

There were originally 26 indentures for this Hundred, but twenty-two only remain. The parishes for which they are missing are Camborne, Redruth, Illogan, and either St. Levan or Gwithian; the other being annexed to a parish; St. Levan to Burian, or Gwithian to Phillack. The growth of the population in this Hundred has been greater than in any other, being 1440·783 per cent. from 1377 to 1861; whilst for the whole of the county the increase for the same period was 613·777 per cent. only, but it is apprehended that a considerable decrease will appear upon the new enumeration.

Hundred of Kerrier. Schedule F. $\frac{8}{3}\frac{7}{2}$.

The whole number of indentures pertaining to this Hundred have been preserved, and the writing on them is as clear and bright as when written, though the ends of some have decayed from damp. We fail, however, to identify some of the ancient names with those of modern parishes. Several of the places mentioned were doubtless Chapelries belonging to other parishes: whilst Mabe and Manaccan remain unappropriated. Falmouth had at that date no separate existence, having, of course, been taxed under Budock, from which parish it has been separated in modern times.

$\frac{8}{2}\frac{7}{8}$ Particule Compoti Willielmi Bruyn Chivaler, Radulphi Clegher, Henrici Trefuswethen, Ricardi Rosogon et Willielmi Boneface Collectorum cuiusdam subsidii quatuor denariorum de quolibet homine et femina laico etatem quatuordecim annorum excedenti infra regnum Anglie domino Regi Edwardo

tertio post conquestum per Communitatem Anglie in parliamento suo apud Westmonasterium anno regni sui Lj° concesso. Videlicet de huiusmodi subsidio de huiusmodi hominibus et feminis infra Comitatum Cornubiæ proveniente ut infra.

Iidem onerant se de lxxix li xxd receptis de huiusmodi subsidio infra hundredum de Westwefleschire prout patet per xxiiij Indenturas inter ipsos collectores et constabularios ac duos homines de probioribus hominibus cuiuslibet ville infra dictum hundredum existentibus factas super hunc computum liberatas continentes. MMMMDCCxlv. personas.

xx

Et de iiij xvij li x s. iiij^{d} receptis de huiusmodi subsidio de Est Wefleschire ut patet per xxix Indenturas inter ipsos Collectores et . . . . . de probioribus hominibus cuiuslibet ville infra dictum hundredum pro V^{ml} DCCCIj personas.

Et de xl li xvijs. iiijd. de huiusmodi subsidio in hundredo de Triggeschire ut patet per xiiij Indenturas super hunc computum liberatas pro MM iiij^{c} lij personas.

Et de xxxiiij li de huiusmodi subsidio in hundredo de Lesnewyth ut patet per xix Indenturas super hunc computum liberatas pro MM xl personas.

Et de xxiiij li v. s viij^{d} de huiusmodi subsidio in hundredo de Stratton ut patet per xiij Indenturas super hunc computum liberatas pro MCCCClvij personas.

Et de C li vj s iiij^{d} de huiusmodi subsidio in hundredo de Poudre ut patet per xl Indenturas super hunc computum liberatas pro vj^{ml}. xix personas.

Et de lxvj li v s viij^{d} receptis de huiusmodi subsidio in hundredo de Petreschire ut patet per xxiij Indenturas super hunc computum liberatas pro MMMDCCCClxxvij personas.

Et de lxxiiij li vj s iiij^{d} huiusmodi subsidio in hundredo de Penwith ut patet per xxvj Indenturas super hunc computum liberatas pro MMMMCCCClix personas.

Et de liiij li xj s iiij^{d} de huiusmodi subsidio in hundredo de Kerrier ut patet per xxviij Indenturas super hunc computum liberatas pro MMMCClxxiiij personas.

Probatur
Summa Totalis { personarum xxxiiij^{ml} CClxxiiij.
denariorum Dlxxj li. iiij s. viij^{d}.

SCHEDULE A. $\frac{87}{30}$.*

No. of Indenture.	Ancient Name of Parish, &c.	Modern Name of Parish, &c.	Amount of Poll Tax, 1377.	No. of Persons Assessed.	Approx. Population, 1377.	Population in 1801.	Population in 1861.
	Hundred of West Wefleschire.	*Hundred of West.*	£ s. d.				
1	Manerium de Leskerrit.	Manor of Liskeard	3 10 4	211	316		
2	Parochia de Sancti Winnoc	Parish of St. Winnow	3 11 0	213	319	671	1115
3	Ville de Porthpighen	Town of West Looe	2 3 8	131	196	376	770
4	Parochia de Tallan	Parish of Talland	4 2 8	248	372	760	800
5	,, Sent Vep	,, St. Veep	3 0 0	180	270	506	628
6	,, Lanteglos	,, Lanteglos	9 13 4	580	870	678	1271
7	,, Sent Pynnok	,, St. Pinnock	1 6 4	79	119	302	571
8	,, Lanreithou	,, Lanreath	2 2 0	126	189	478	649
9	Ville de Leskerrit	Town of Liskeard	7 13 8	461	692	1860	4689
10	Parochia de Sancti Martini	Parish of St. Martin by Looe ..	2 16 4	169	254	344	343
11	,, Leskirrit	Parish of Liskeard	2 2 0	126	189	848	1815
12	,, Plennit	,, Pelynt	3 11 8	215	323	630	729
13	Ville de Loo	Town of East Looe	2 6 0	138	207	467	1154
14	Parochia de Seint Kayne	Parish of St. Keyne	0 9 4	28	42	139	181
15	,, Bodconok	,, Boconnoc	1 1 0	63	95	212	323
16	,, Brothek	,, Broadoak	1 3 8	71	106	173	274
17	,, Warlaygan	,, Warleggan	1 7 4	82	123	166	295
18	,, Dulo	,, Duloe	3 9 0	207	310	709	1096
19	,, Reprenne †	———	0 7 4	22	33		
20	,, Morual	,, Morval	2 18 0	174	261	533	765
21	,, Cardynan	,, Cardinham	4 1 8	245	367	552	717
22	,, Lansalas‡	,, Lansallos	4 12 0	276	414	847	659

,, *St. Cleer*	,, St. Cleer	11 13 4	700	1050	774	3931
,, *St. Neot*	,, St. Neot				906	1584
	Looe Island §	.. .. ..	.. ..	.. ..	.. ..	8
		79 1 8	4745	7117	12931	24367

* This is the Register mark of the file of Indentures at the Record Office.

† The Chapel of Resprynne is mentioned under St. Winnow in the Inquisitiones Nonarum, p. 347, and in the Enumeration Returns of the present century the whole of the population is included under that parish.

‡ The population of this parish reached its maximum, 884, in 1831, since which date it has continually decreased, which is ascribed chiefly to emigration.

§ Not enumerated in 1801.

SCHEDULE B. $\frac{8}{3}\frac{7}{4}$.

No. of Indenture.	Ancient Name of Parish, &c.	Modern Name of Parish, &c.	Amount of Poll Tax, 1377.	No. of Persons Assessed.	Approx. Population, 1377.	Population in 1801.	Population in 1861.
	Hundred of Est Wefleschire.	*Hundred of East.*	£ s. d.				
1	Parochia de Kelstok	Parish of Calstock	3 8 0	204	306	1105	7090
2	Manerium de Tremeton	Manor of Trematon	5 13 4	340	510		
3	Parochia de Lansant	Parish of Lezant	2 0 0	120	180	610	815
4	de Dounhefedburgh	Launceston	5 0 8	302	453	1483	2069
5	Parochia de Sancti Stephani, Launceston	Parish of St. Stephens by Launceston	6 16 8	410	615	738†	873
6	,, Northill	,, North Hill	4 0 0	240	360	782	1263
7	,, Sancti Germani	,, St. Germans	12 15 4	766	1149	2030	2842
8	,, Sancti Malany	,, St. Mellion	1 7 4	82	123	284	299
9	,, S. Erne*	,, St. Erny	1 13 8	101	151		79
10	,, Landylp	,, Landulph	2 5 0	135	203	529	547
11	,, Lawanek	,, Lewannick	2 13 4	160	240	548	685

12	,,	Lawitton	,,	Lawhitton	1	8	0	84	126	289	435
13	,,	Egloskery	,,	Egloskery	2	5	4	136	204	307	510
14	,,	Botsflynna	,,	Botus Fleming	1	15	4	106	159	210	237
15	,,	Macre	,,	Maker	1	16	0	108	162	1691‡	1759‡
16	,,	Pidrewyn	,,	South Petherwyn	3	7	4	202	303	699	876
17	,,	Lankynhirn	,,	Linkinhorne	4	12	8	278	417	924	2551
18	,,	Quedyk	,,	Quethiock	2	18	8	176	264	587	728
19	,,	Antoni	,,	Antony	2	1	4	124	186	1795	3887
20	,,	Mehyniet	,,	Menheniot	5	13	4	340	510	918	2423
21	Ville de Saltesse		Town of Saltash		3	6	8	200	300	1150	1900
22	Parochia de Lanrak		Parish of Landrake		3	3	4	190	285	613	714
23	,,	Pileton	,,	Pillaton	1	10	4	91	136	336	349
24	,,	South hill	,,	Southill	5	6	8	320	480	447	691
25	,,	Sancti Johannis	,,	St. John	0	8	4	25	38	110	213
26	,,	Sancti Iuonis	,,	St. Ive	2	16	4	169	253	486	2593
27	,,	Shevioke	,,	Sheviocke	1	8	0	84	126	409	671
28	,,	Stoke	,,	Stokeclimsland	4	11	4	274	411	1153	2554
29	,,	—	,,	—	1	8	0	84	126		
				Callington						819	2202
				St. Dominic						538	862
				Laneast						179	244
				St. Thomas						173	266
				St. Thomas Street						182	621
				Tremayne						91	109
				Tresmeer						129	148
				Trewen						193	178
				Rame						904	792
				St. Stephens by Saltash						1150	1387
					97	10	4	5,851	8,776	24,445	47,689

* Now a Chapelry to Landrake.

† This number includes the parish of St. Stephens and Borough of Newport. In addition to this, the Borough and Parish of Launceston in 1801, contained a population of 1,483.

‡ Exclusive of Vaultershome Tything, which was formerly in Devon.

SCHEDULE C. $\frac{8}{3}\frac{7}{1}$.

No. of Indenture.	Ancient Name of Parish, &c.	Modern Name of Parish, &c.	Amount of Poll Tax, 1377. £	s.	d.	No. of Persons Assessed.	Approximate Population.	Population in 1801.	Population in 1861.
	Hundred of Lesnewyth.	*Hundred of Lesnewth.*							
1	Parochia de Treualgo	Parish of Trevalga	0	17	0	51	76	100	158
2	„ Alternon	„ Alternon	6	1	4	364	546	679	1389
3	Ville de Kameleford	Town of Camelford	1	2	4	67*	100		
4	Parochia Sancti David	Parish of Davidstow	2	7	0	141	212	217	394
5	Manerium de Tyntaggel	Manor of Tintagel	2	6	8	140	211	649	900
6	Ville de Tyntaggel	Town of Tintagel	1	10	0	90	135		
7	Parochia de Sent Genes	Parish of St. Gennys	2	3	4	130	195	597	572
8	„ Sancti Julita	„ St. Juliot	1	7	8	83	124	199	226
9	„ Poundestok	„ Poundstock	1	19	0	117	176	617	534
10	„ Otteram	„ Otterham	0	13	4	40	60	141	160
11	„ Lesnewyth	„ Lesnewth	1	5	4	76	114	104	114
12	Ville de Botreaux Castre	„ ———	2	0	4	121	181		
13	Parochia de Treneglos	„ Treneglos	1	3	4	70	105	196	138
14	„ Warbestow	„ Warbstow	2	0	0	120	180	330	419
15	*Not Cornish*	„ ———	2	1	8	125	186		
16	Parochia de Menester	„ Minster	0	16	8	50	75	311	505
17	„ Miglestowe	„ Michaelstow	1	10	4	91	137	158	219
18	„ ———	„ ———	1	7	8	83	125		
19	„ Cleder	„ St. Clether	1	7	0	81	122	134	229
		„ *Forrabury*	..	..	..	..	..	140	366
		„ *Lanteglos & Camelford*	..	..	..	..	..	912	1620
		„ *Advent*	..	..	..	..	..	170	208
			34	0	0	2040	3060	5654	8151

* Not now separately enumerated, but included in the Parish of Lanteglos.

SCHEDULE D. $\frac{87}{29}$.

No. of Indenture.	Ancient Name of Parish, &c.	Modern Name of Parish, &c.	Amount of Poll Tax, 1377.	No. of Persons Assessed.	Approx. No. of Populatn. 1377.	Population in 1801.	Population in 1861.
	Hundred of Stratton.		£ s. d.				
1	de Straton	Stratton	2 10 0	150	225	960	1755
2	Parochia de Jacobstow	Parish of Jacobstow	2 9 0	147	220	432	462
3	„ Wyke	„ Week St. Mary	2 5 0	135	203	566	611
4	„ Tamerton	„ North Tamerton	2 15 8	167	251	403	486
5	„ Briggeuel	„ Bridgerule	0 11 0	33	50	192*	†
6	„ Kylcamtone	„ Kilkhampton	2 13 4	160	240	808	1198
7	„ Launcels	„ Launcells	1 10 0	90	135	647	693
8	„ Merwynchurge	„ Marhamchurch	1 7 0	81	121	414	581
9	„ Wytston	„ Whitstone	1 8 4	85	127	345	391
10	Ville de Kylkamton	Town of Kilkhampton	0 19 4	58	87	‡	
11	Parochia de Morstowe	Parish of Moorwinstow	3 7 0	201	301	874	868
12	„ Poghewill	„ Poughill	1 2 4	67	101	297	363
13	„ Boyton		1 7 8	83	125	319*	379
			24 5 8	1457	2186	6257	7787

* Those portions only of Bridgrule and of Boyton, which are in Cornwall, are included in these numbers, and it is presumed that the same parts only were assessed to the Poll Tax under Cornwall.

† In 1861 the whole of the parish of Bridgerule, though partly in Cornwall, was enumerated under Devon, the population being stated as 410.

‡ Enumerated under the parish.

No. of Indenture.	Ancient Name of Parish, &c.	Modern Name of Parish, &c.	Amount of Poll Tax, 1377. £ s. d.	No. of Perons Assessed.	Approx. Population 1377.	Population 1801.	Population 1861.
	Hundred of Penwith.						
1	Parochia de Vthnow	Parish of Perran-Uthnoe	1 10 0	90	135	506	1507
2	„ ffeliciter	„ Phillack	2 13 4	160	240	1475	5381
3	„ Morueth	„ Morvah	0 8 0	24	36	282	380
4	„ Beriane	„ St. Buryan	4 13 8	281	421	1161	1428
5	„ Sancti Madarni	„ Madron	5 0 0	300	450	4946‡	11926‡
6	„ Sancti Paulini..	„ St. Paul	6 13 8	401	602	2937	5072
7	„ Sancti Justi	„ St. Just	4 19 8	299	448	2779	9290
8	„ Sancte Sancrete	„ Sancreed..	1 14 0	102	153	782	1233
9	„ Sancti Weluelini	„ Gulval	2 6 8	140	210	1076	1743
10	„ Ludwin	„ Ludgvan	2 14 0	162	243	1324	3480
11	„ Sancte Senar	„ Zennor	1 19 0	117	175	544	1933
12	„ Sancti Erti	„ St. Erth	2 9 0	147	221	1122	2558
13	„ Sancti Michaelis .. / „ de Marghasiow.. ..	„ Marazion	3 10 0	210	315	1009	1545
14	„ Sancti Hillarii..	„ St. Hilary	2 14 8	164	246	990	1914
15	„ Sancti Siluani *		2 10 0	150	225		
16	„ Sancti Tewynoti	„ Towednack	1 9 4‖	87	131	465	1007
17	„ Sancte Ya †	„ St Ives	3 2 8	188	282	2714	7027
18	„ Sancte Semane	„ Sennen	1 12 4	97	145	431	613
19	„ Lauanta †	„ Lelant	2 9 4	148	222	} 1083	2319
20	„ Euimuy juxta Lauanta ..	„ Uny Lelant	1 10 4	91	137		
	„ **Crowenne	„ Crowan	2 14 8	164	246	2587	4131
	„ **Wynner	„ Gwinear	3 0 4	181	272	1654	2880

	,, *Camborne*					4811	14056
	,, *Gwithian*					329	774
	,, *Illogan*					2895	9683
	,, *St. Levan*			756	1134	400	447
	,, *Redruth*					4924	11504
	,, *St. Michael's Mount*					..	132§
		74	6 4	4459	6,689	43,226	102,963

* The Chapelry of St. Silvan was in the Parish of St. Beriane, as appears from the Inquisitiones Nonarum, p. 348.
† The Church of Lavanta had the Chapel of St. Hye or Hya. Ibid.
‡ Including Penzance Chapelry, which contained in 1801 a population of 3382 and in 1861 of 9414.
§ Separately enumerated for the first time in 1811. ‖ There is an error and overcharge of 4d. in this parish.
** These two indentures are placed upon a separate file and bear the register mark $\frac{87}{35}$.

SCHEDULE F. $\frac{87}{32}$.

No. of Indenture.	Ancient Name of Parish, &c.	Modern Name of Parish, &c.	Amount of Poll Tax, 1377.	No. of Persons Assessed.	Approx. Population, 1377.	Population in 1801.	Population in 1861.
	Hundred of Kerrier.		£ s. d.				
1	Ville de Helstoneburgh	Town of Helston	3 2 8	188	282	2248	3843
2	Parochia de Corantini	Parish of Cury *	2 0 0	120	180	304	517
3	,, Sancti Germocii	,, Germoe	0 15 4	46	69	629	1015
4	,, Meylar	,, Mylor	1 0 8	62	93	1665	2213
5	,, Arwothal	,, Perranarworthal	0 18 0	54	81	884	1517
6	,, Penryn	,, Penryn	3 2 0	186	279	2324	3547
7	,, Santi Eninni †	,, ———	0 13 8	41	62		

8	„	Sancte Wendrone † ..	„	Wendron	2	14	4	163	240	3006	6008
9	„	Sancti Sensidini	„	Sithney	2	4	0	132	198	1420	3306
10	„	Wynanton ‡	„	Gunwalloe	1	12	4	97	145	216	244
11	„	Sancti Rumoni Parvi ..	„	Ruan Minor	0	13	4	40	60	317	260
12	„	Sancti Antoni	„	St. Anthony in Meneage	0	18	0	54	81	261	252
13	„	Grade	„	Grade	1	4	8	74	111	320	327
14	„	Landewennek	„	Landewednack	1	3	0	69	104	244	429
15	„	Sancti Rumoni Magni ..	„	Ruan Major	0	16	4	49	73	142	141
16	„	Sancte Breace	„	Breage	3	5	0	195	293	2534	5173
17	„	Sancti Kefrani	„	St. Keverne	9	11	4	574	861	2104	1892
18	„	Sancti Maugani	„	Mawgan in Meneage ..	1	9	8	89	133	785	895
19	„	Sancti Melany	„	Mullion	1	9	8	89	133	529	679
20	„	Sancti Landy §	„	———	1	3	0	69	104		
21	„	Sancti Constantini ..	„	St. Constantine	4	6	8	260	390	1229	2014
22	„	Sancti Martini	„	St. Martin in Meneage ..	1	10	4	91	136	363	419
23	„	Sancti Gluyani	„	St. Gluvias	1	0	8	62	93	624	1213
24	„	Sancte Stediane	„	St. Stithians	1	10	8	92	138	1269	2358
25	„	Sancti Budoci	„	St. Budock	2	0	8	122	183	779	2251
26	„	Menster ‖	„	———	1	2	0	66	99		
27	„	Sancti Maunani	„	St. Mawnan	1	0	0	60	90	427	572
28	„	Sancte Weneppe	„	Gwennap	2	3	4	130	195	4594	10537
			„	*Mabe*						387	613
			„	*Manaccan*						489	505
			„	*Falmouth*						4849	9392
					54	11	4	3274	4910	34942	62132

• Formerly called St. Corentine, from S. Corentinus, the Patron Saint.
† The chapels of Helleston and St. Emnini were annexed to the church of St. Wendrone, Inq. Non., p. 348.
§ The chapel of St. Landy was annexed to the church of St. Melor. Ibid.
‡ The chapels of Corentine, Wynyanton and Gyrnogh, were taxed with the church of St. Bryace. Ibid. 344.
‖ The church of Mynster, in this Hundred, is mentioned in the Inq. Non., p. 344.

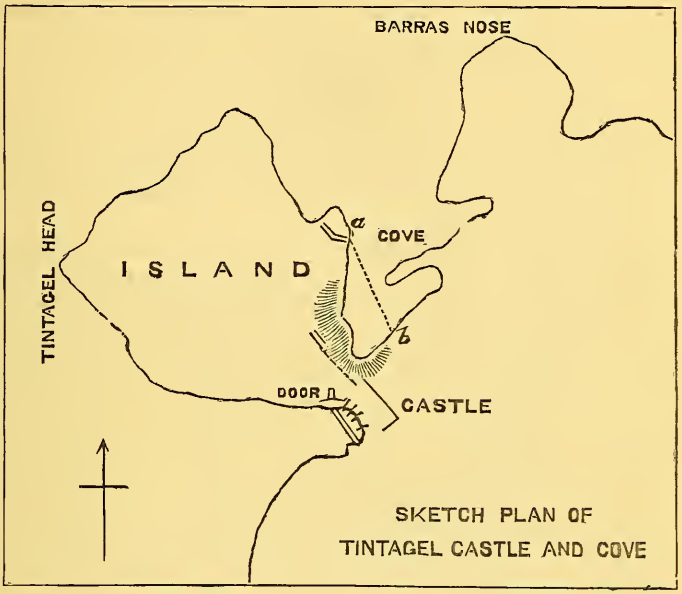
III.—*A few observations on Tintagel Castle.*—By the Reverend Prebendary Kinsman, M.A., Constable of the Castle.

Read at the Spring Meeting, May 23, 1871.

At the request of the Committee of the Royal Institution of Cornwall, obligingly communicated to me by my esteemed friend Mr. W. J. Henwood, F.R.S., the President, I readily offer for their consideration a few observations on the disputed question of the position of that portion of Tintagel Castle called *the Island* with respect to that part of the ruin situated on the mainland.

It is difficult, without a careful personal inspection of the place, to form a correct idea of the various facts and circumstances connected with the site of this most ancient Castle. The same indeed may be said with respect to the Ruin itself, which, although full of interest, is surrounded with archæological difficulties, not observable to the ordinary visitor, but very apparent to the critical and accurate Antiquarian. But after much consideration, and frequent examinations of the place, as well as of the geological formation of the strata at that part of the cliff, I have no hesitation in stating my conviction that the present state of the ruins of Tintagel Castle does not represent its original form. The detached portion now on the 'Island' I believe was originally connected with that on the mainland, and the present chasm which divides the two parts of the building is the result of a succession of land-slips caused by the numerous faults and generally disturbed state of the slate beds at the point. The gradual widening of the chasm is continually going on, and the fall of large portions of the cliff (especially on the northern part of the ruin) is frequently occurring. There is every reason to believe that the greater part of the present Cove was formed by these land-slips, and that subsequent to the building of the Castle

the N.E. cliff extended from a point marked (a) in the accompanying plan to (b). I cannot therefore arrive at any other conclusion than that the Castle was a continuous structure—extending from the gateway of the great court on the mainland to the encircling wall on the Island.



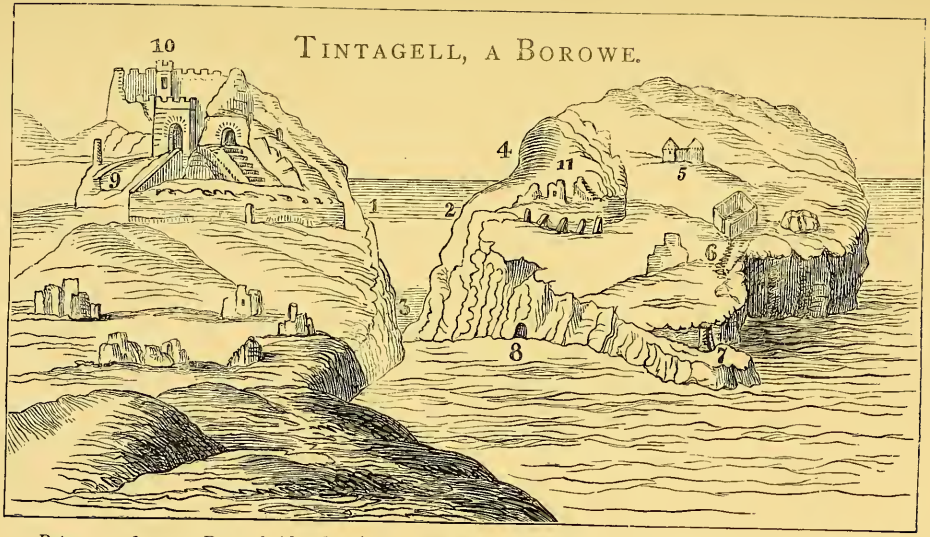
By reference to the map of the coast in the immediate vicinity of the Castle Cove it will be seen how, from similar geological causes, the peninsular type exists. The same observation indeed applies to many of the headlands between Tintagel head and Pentire-glaze Point. An inspection of the southern portion of the ruin on the mainland in connection with the precipice on which it stands, induces me to believe that the Castle originally occupied a much larger site in this direction than it does at present. Within the memory of many now living, a portion of the ruin attached to the circular boundary wall has disappeared, and the gradual formation of the existing precipice for a considerable space, extending from the mainland to the Island, is most easily traced. In fact, I entertain no doubt that originally the site of the Castle

in this direction extended from the present door-way of the Island portion of it, to the opposite side, and parallel to the existing precipice. I am not only led to this conclusion from the state of the cliff in each direction, but also from portions of ancient masonry on the Island part of the ruin, close to the Door, which, evidently, were connected with walls no longer in existence. It is moreover manifest that the existing boundary wall on the southern portion of the ruin on the mainland was originally, either a partition or built for protection after the fall of the cliff, and not an outer and boundary wall, and that the massive circular wall, which at present forms a striking feature of the ruin, originally extended on the cliff (which has since fallen and now forms the precipice) for at least 30 or 40 yards.

After repeated observations, I feel convinced that the present picturesque appearance of Tintagel Castle is entirely attributable to a succession of slips of the strata, which are a soft schistose clay-slate, both on the western and the northern sides. Any one looking at the north wall of the Great Court on the mainland will see, not only how exactly it corresponds with that portion on the opposite side of the chasm on the Island, but how by the process of land-slips on either side—(a process which is even at this day in action)—the great interval has been caused. I can, therefore, only conclude that this great boundary of the Castle on the northern side was unbroken and continuous, extending, originally, from the N.E. angle of the Great Court to the Island.

The site of the Castle then, I conclude, at first represented a promontory terminating in Tintagel head. It is probable indeed, that this promontory always presented an irregular outline, and that at the point where the Castle originally stood that irregularity assumed somewhat of a peninsular appearance; but that originally the Castle, now disunited by a vast chasm, was a continuous and unbroken fortress, I entertain no doubt whatever.

The fullest ancient record of the Castle is, I believe, that given by Hals, who states, upon the authority of Carew, that the drawbridge which connected the two parts of the Castle "was extant within man's remembrance" when he wrote his Survey of Cornwall, which was published in 1602. Now we have the evidence of the caption or seizin of the Castle taken in the reign of Edward the



Between 1 *&* 2, *a Draw bridge decay'd. Between* 1 *&* 3, *ye Descent. Between* 3, *&* 2, *ye Ascent.* 3, *ye Istmos.* 4 *Buildings fallen into ye Sea.* 5, *the Old Chappel.* 6, *a Spring of fresh water.* 7, *the Iron Gate.* 8, *a Vault thorow the Rock.* 9, *a Gate guarded w.th Iron, at ye entrance into ye first Building, on ye Land side.* 10, *ye Main Building on the Land side.* 11, *the ruin'd Building on the Island.*

Norden. d. 1626.

from Norden. p. 80.

Third, A.D. 1337,—that at that time, *i.e.* 165 years before Norden or Carew wrote their account, *it was "ruinous."*

I entertain, indeed, no doubt that at the date indicated by Hals, viz., about the year 1500, *i.e.*, 370 years ago, the chasm, which has been constantly widening from that time to the present, admitted communications with the portion of the Castle on each side of it, by means of a rude bridge, possibly formed of wood, with an iron chain; but I cannot, in the face of evidence that the Castle was ruinous 534 years ago, admit the assumption of Hals, upon Carew's authority, that the state of things which he described referred to its original condition. Even Norden's drawing of the ruin, to some extent, supports my supposition. By reference to the accompanying sketch, which has been kindly made from the original by my friend Mr. Rogers, of Penrose, it will be seen at once that, even in his day, 1602, what he calls "the main building on the land side" (10) and which I have described as the circular wall, extended over a considerable portion of what is now precipice; and also that he indicates by the figure 4 the portion which I have supposed originally extended across the chasm from the Island to the mainland in this direction, and which he describes as "Buildings fallen into the sea."

But, granting for a moment the assumption that the present path which leads from the mainland portion of the ruin to the Island has been formed by the débris of fallen rocks, which is, however, by no means apparent, since at the base of the cliff there is no indication which would warrant, in my opinion, the assumption, I would still, for the reasons already adduced, maintain the original continuity of the Castle; for, I should argue, in support of my position, that a cavern which had originally passed beneath the causeway had fallen in, thus causing the artificial passage from one part to the other.

Such a supposition I imagine to be quite allowable, even if it could be proved that at the base of the rock there was a separation of the two sides of the cliff, inasmuch as there are now close to the point in question two large caverns, and on the opposite side of the Cove there are corresponding ones, and one which may very probably have extended across the Cove to the very point in question. I mention this not from any persuasion that such an extension did ever actually exist, but to show, that even if it

could be satisfactorily proved that the present neck of the peninsula was formed by the fallen débris of the upper strata, it would by no means follow that therefore the upper surface was also disunited, and that one part of the Castle was insular.

Considering then the ruin in its present state, the nature of the western precipice, and of the great N.E. wall, as seen on either side of the chasm, and above all the geological formation, which, from the work of decay at the spot still going on, tells its own story, I can arrive at one conclusion only, namely, that Tintagel Castle was originally a fortress, extending without any interruption, from the great gate-way on the mainland to that portion of the ruin on the island. The disunited parts, very probably, were for a time connected by means of some rude bridge of wood and iron until the ravages of time so widened the breach as to give this far-famed and most interesting ruin its present picturesque appearance.

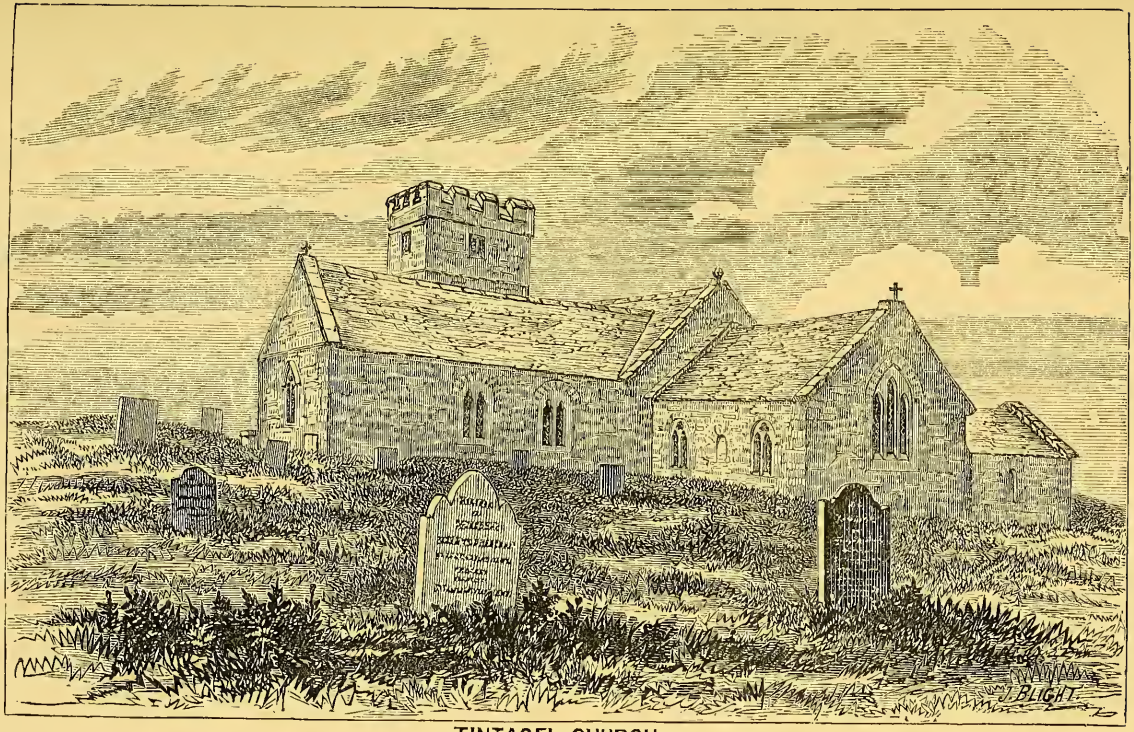
R. B. K.

Tintagel, March 27th, 1871.

IV.—*Notes on Tintagel Church.*—By H. Michell Whitley, C.E.

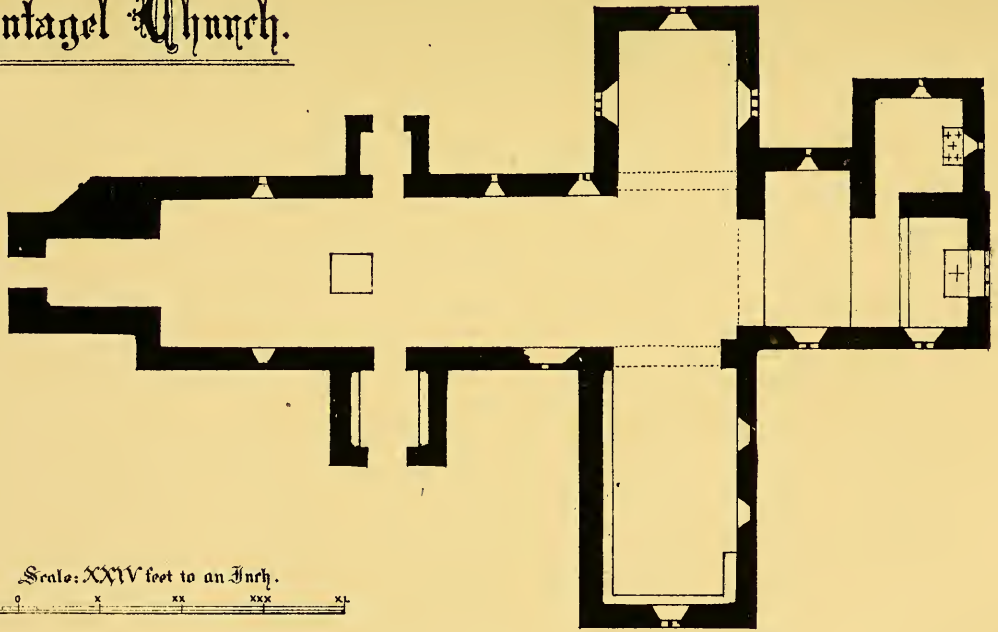
AMONGST the Churches of Cornwall there is not one that possesses the interest which attaches to Tintagel. Standing on that border-land, between the hills and "The winding shore of Severne sea," which has been invested with so much mystery and poetry by the legends of our famous King Arthur, it derives additional interest from its high antiquity; grey, weather-stained, and venerable, its time-worn walls carry us back to the age of our Saxon forefathers.

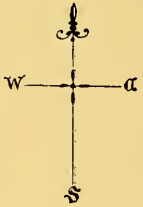
The church is cruciform (as will be seen from the plan), and consists of Chancel, Ladye Chapel, Nave, North and South Transepts, Tower, and North and South Porches.



TINTAGEL CHURCH.

Tintagel Church.





Scale: XXV feet to an Inch.

LAKE, LITHO: TRURO.

A.W.M.

The main walls of the Chancel are of Saxon work, with the exception of the East end, which is modern. In the South wall there is a Piscina, with a plain trefoiled head; and in the North wall a small Aumbry.

The small round-headed window in the recess to the west of the Ladye Chapel is Saxon, and there are the remains of another Saxon Window, now blocked, in the South wall, which is at present pierced by a couple of Modern two-light windows, inserted under Norman arches.

In the South wall of the Chancel, under an arch of Decorated work, is a tomb, probably of some benefactor of the church, with a peculiar raised cross on it. There is another coffin-slab in the Chancel. It lies on the floor of the recess to the west of the Ladye Chapel. The surface of this slab is ornamented with a floriated cross, whilst above the cross is a head carved in relief, with flowing hair, the features however being obliterated. This tomb commemorates an ecclesiastic; and its date may be ascribed to the latter end of the 13th, or commencement of the 14th Century.

Beneath the Altar is a Brass, the date of which is about 1430, to the Memory of Johana, the mother of John Kelly, dean of the Collegiate Church of St. Crantock. She is represented wearing the horned head-dress, over which a veil is thrown, as was the fashion at that time; and she is clad in the elegant long gown then worn, with close sleeves edged with fur at the wrists, and gathered in by a girdle around the waist.

The Rood-Screen still remains. It is of Perpendicular work well carved. Near it are two old bench-ends, each with a couple of shields, one bearing a cross saltire and a chevron between three roses; the other, the letter T on one shield, and the spear and sponge on the other.

The Chancel Arch is plain, of Norman work; one corbel being ornamented with the zigzag, the other with the star moulding.

From the Chancel an old oak square-shouldered doorway, once painted a deep red, leads into the "Ladye Chapel," which is lighted by two small deeply-splayed round-headed windows. Beneath the eastern one still remains the original stone altar, with a rough slate slab marked on the top with the usual five crosses. On each side of the window over the altar is a bracket, in the

form of a *tau*, for an image. The aspect of this little chapel is remarkably quaint and venerable; and, in my opinion, its erection must be ascribed to the Saxon period.*

The North Transept is principally Early English, with the exception of the West wall, which is Modern. The arch is plain, without mouldings, and appears to have been moved, as it now springs from within the old corbels. The East window is an Early English triplet, and the North is a Debased Decorated window of two lights, with a quatrefoil in the head. The sill of the East window is said to have originally been an altar, with the usual crosses; but this has been removed during the last few years. On the north side of this window is a bracket, and on the South there is a small square Squint, at present blocked. Above its opening into the Chancel is a square niche, also plastered up. On the ends of the gables a sheep's and a ram's heads are carved.†

The South Transept is of much greater length than the North. The East and West walls correspond to the masonry in the South wall of the Nave, whilst the South wall is Modern. The Transept Arch corresponds to the one on the North of the Nave, just described; and the Transept is lit by a Modern two-light window in the South wall, and by a couple of very interesting two-light windows with trefoiled heads in the East wall; these latter are inserted under Norman Arches, and show the transition from the Early English style to the Decorated, as by piercing the heads the result would be Plate Tracery.

A stone bench runs around the west, south, and part of the east sides; and here I would point out the judgment exercised by the original builders, who carefully guarded against inserting any windows in the western wall, where they would be fully exposed to the force of the weather.

The long and narrow Nave is of the genuine Saxon type, lit by two narrow round-headed windows (with the characteristic long-

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* During the restoration of the church the splay of a window (the jambs having disappeared) corresponding to the Early Saxon window in the South of the Chancel, was discovered, opening into the Ladye Chapel; but this does not disprove the date of the chapel to be Saxon, but only (if the window was completed) that the Church was built first, whilst the Chapel was added shortly afterwards, in the same Period.

† During the restoration, a Norman window was discovered in this Transept, which had been replaced, at a lower pitch, by a Decorated one.

and-short work surrounding them), by a Modern two-light window in the north wall, and by a round-headed Norman window and a Modern triplet in the south wall.* The old corbel-table is still in its place; it is of stone, bevelled from above inwards. Inside the North door, on the East side, still remains a bracket for an image.

A great number of the old bench-ends, of 15th Century work, stained and blackened with age, were still in position in the Nave; they each bear two shields, which were covered with devices of the Passion and others then usually placed in such positions.

The Font is very curious. It is square with faces at the angles, and is supported by four octagonal pillars and by a central circular one; the northern edge being ornamented for a short distance with crosses.

The North Door is Saxon, and the South a very good example of Norman work.

Both Porches are additions to the original plan of the church; they are of Perpendicular workmanship, roofed with large slabs of slate. On the east seat of the South Porch a peculiar cross with diamond head is incised.

The Tower is of Perpendicular date; of three stages, with battlements but no pinnacles, with a tower window of three lights; it stands at the western end of the Nave, and, plain and sombre in appearance, its proportions accord well with its low and venerable church.†

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* During the restoration, two Norman windows were discovered in this wall, thus showing it to have been restored in that Period.

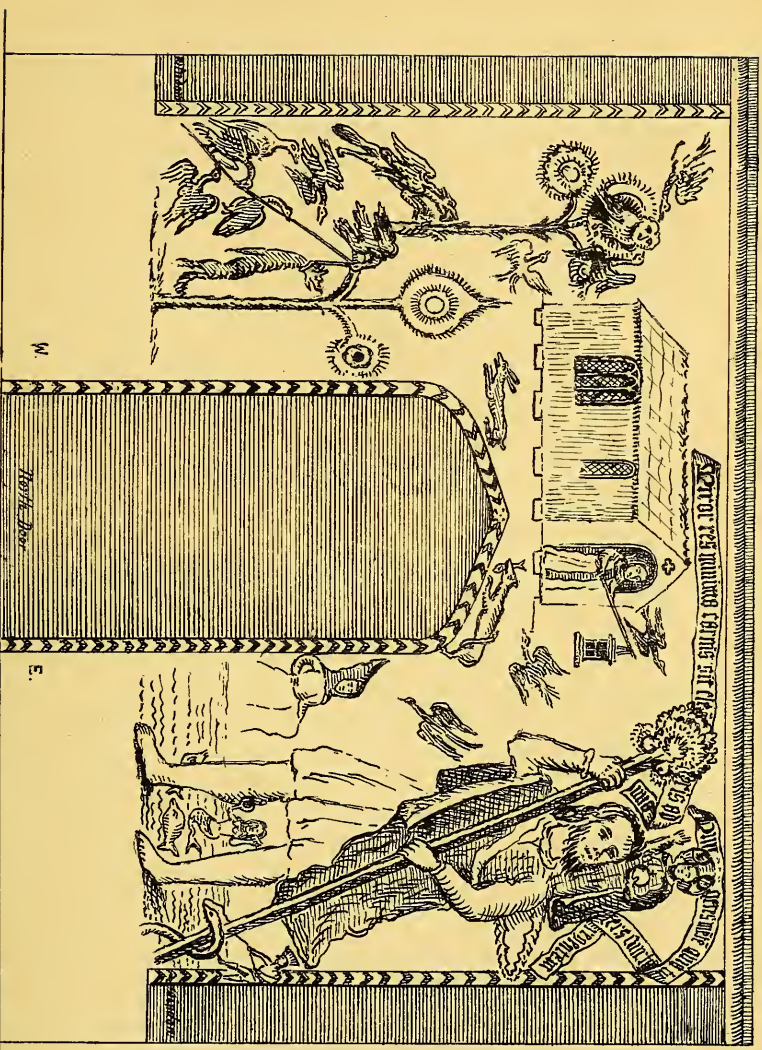
† In these Notes, I have described the condition of the church as it existed before its restoration; and, for the discoveries made during the repairs I am indebted to the courtesy of the Vicar, the Reverend Prebendary Kinsman.

V.—*Description of a Fresco in Ludgvan Church; from the original drawing by Dr. Borlase.*—By Mr. W. C. Borlase, F.S.A.

Read at the Spring Meeting, May 23, 1871.

AMONGST the MSS. of Dr. Borlase I found the accompanying drawing of a fresco, discovered more than a century ago in the parish church of Ludgvan; and on referring to another volume (the Parochial Memoranda) I was also so fortunate as to light upon a description of the same, written apparently on the day when it was brought to light. Although it is evident that this painting cannot lay claim to any great antiquity, and although the merits of the production, as a work of art, certainly are not remarkable, yet any relic of Pre-Reformation times still lingering beneath the white-wash on the walls of our Cornish churches cannot fail to be a subject of interest at the present day. Perhaps the most remarkable feature in the picture is the sketch of what appears to be intended for one of those ancient chapels or oratories once so common in this country. The colours of the vestments of the priest are unfortunately unrecorded, or they might have afforded some valuable hints on the perplexed question of Ritual. The scrolls are certainly late, and seem to belong to much the same date as those at Mylor and Lanivet. (*Journ. Roy. Inst. of Cornwall*, 1870, plates 2 and 3). In several of the Western churches, frescoes have been discovered, but none so perfect as the Ludgvan one. Dr. Borlase's account of it is as follows:—

"March 14, 1740. The masons, brushing the walls of the Church in order to wash them afresh with lime, brought down a thin scale of plaister, which discovered the following picture on each side the North door near the Western end of the church. On the East side of the door is St. Christopher with his staff or flowering sceptre. Betwixt his feet is a mermaid or nymph of the sea, with her glass and comb, the one to dress, the other to direct her



The above is a Fac-Simile-Copy (reduced one-half in length & breadth) of Dr. Borlase's Writing, and Drawing of the Wall-Painting formerly at Ludgvan, Cornwall. W. Iago. 1872.

Fresco in Ludgvan Church.

in dressing her locks; under her are some fish, and, nearer to the Eastern corner of the painting, a man of a very dwarfish proportion drawing out a fish by a line; opposite to this, at the Western corner is a Monk in his Cowle, fishing lines in his hands; signifying perhaps the Regulars' incroachments on the Parochial Ministers, the Monks of the Mount taking away the tythe fish from Ludgvan. On St. Christopher's shoulder is the Bambino or little Christ, a world in his hand, and on his head a party coloured kind of Turbant. On a label round his head 'Dux geres mentem, quia tu fers cuncta regentem.' On the Eastern part of the arch of the door is a dog (of the greyhound kind) with a fish in his mouth, intimating that the Priests should not be deprived of their tythe fish by the fraud of their parishioners, least, like this dog, (pursuing his proper prey the hare), by having a fish in his mouth may be incapable of obtaining it, forasmuch as that fraud in one small point may prevent and deprive us of a greater and more natural blessing which we might otherwise expect. Above the door is a small Parochial Chapel or Chantry, and several such there were formerly in this parish; at Trewoll one; at Colurrian (called St. Thomas's chapel) one; and at Ludgvan-Lez a third; if there were no more; in the door one of the Clergy, his garment white and seeming a surplice on which a scarfe; he holds in his hand a sacred wand or stick, at the end of which is suspended the holy cista or box in which the Host was carried on solemn occasions from the Altar to particular parts of the parish. Over the cista is a bird to represent the Holy Ghost as a Dove hovering over the sacrifice of the Host; above the Priest's head flies a label with the following verse in the same text letters as before 'Miror res minima carnis sit Cleris ademta,' intimating the Priest's surprise at the parishioners defrauding him of his provisional tithes and sustenance when from him they had so much more valuable food, even that of the Host. At the Western end rises a Tree or Stalk of flowers, (mostly of the shape of sun-flowers). On the largest flower perches an owl in peaceable gravity, at which some birds of prey fly in a hostile manner, as if to pick out his eyes. At the foot of this flowering shrub is a fox retiring in great haste with a stolen goose on his back.

Below this is the stem of another tree or shrub of like flower as before. The fox is here brought to condign punishment; he

has a string about his neck, and six geese are busily employed with their bills in drawing him up and hanging him on the tree. There is no doubt that this last important emblem was to shew the parishioners the fatal consequence of depriving the Parson of his tithe Geese." (Paroch: Mem: p. 10; Account of Ludgvan Pish., p. 31).

Whatever may be the views taken of Dr. Borlase's interpretation of this picture, I have thought it worth while to transcribe it in full; he finishes his account with the following sentence:—

"It must be confessed that such Fooleries scarce deserve a place here without apology, much less a place in the house of God; but in times of ignorance, Devotion will be always jostled, and disgraced by superstitions, not to say profane triflings." After this I need hardly say the painting was very properly embedded in Protestant white-wash, and has never since seen light.

Castle Horneck, May 22nd, 1871.

VI.—*On the St. Christopher Wall-Paintings, at Ludgvan, Mylor, &c. By the* Rev. W. Iago, B.A., Westheath, Bodmin, *(L.S. of the Society of Antiquaries, London).*

MR. Wm. Copeland Borlase having invited me to make some observations upon the subject of his paper—"The Ludgvan Fresco, described and drawn by the late Dr. Borlase," I would remark, that the position of the St. Christopher,—a little to the east of the north door, agrees with that of the fragmentary group discovered at Mylor in 1869, of which, at the time, no definite explanation could be given. The subject, so far as the main figure is concerned, is the same in both cases; for the Saint's beard, arm, hand, and fructed palm-tree staff, together with the feet and skirt of the Divine Infant, may be distinctly recognized.* The Rev. F. C. Hingeston-Randolph on seeing the Mylor Diagram when published, conjectured that the dim outlines might possibly admit of such an explanation—and his surmise was correct.

St. Christopher was depicted in many churches, as in the instances before us, on that part of the north wall which was opposite to the south doorway. This was in order that all on entering might, as soon as possible behold him, for it was held that no sudden, violent, or unshriven death would befal any on the day they gazed upon his image or picture—and his figure would likewise preserve from all harm the building on which it might be placed.

> "Cristophori faciem die quacunque tueris
> Illa nempe die morte mala non morieris."
> "On the day thou seest St. Christopher's face
> By no ill death shalt thou end thy race."

Molanus, (Professor of Theology, Louvain, 1617), relates in his "Sacred Images," that for reasons such as these it had been usual to figure St. Christopher in Halls and Churches; and that in some parts of Germany representations of him might be found outside, at the entrance or on the wall.

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* *Cornwall Royal Institution Journal*, Vol. iii., p. 169, Pl. 2, Fig. 1.

From another source also we learn, what was believed concerning "great Christopher, who, painted, is with body big and tall." He (like St. Nicholas) would keep the mariners from "dangers and disease, though beaten with the boisterous waves and tossed in dreadful seas." He would guard his servants "from fearful terrors of the night and make them well to rest, by whom they also, all their life, with divers joys were blest;" and notwithstanding that St. Peter was the Patron Saint of Fishers, a tutelage over fishing came to be regarded as one of the minor attributes of this Saint.

At St. Mark's, Venice, Mr. Albert Way informs me, a sculptured figure of St. Christopher occurs on the north side of the church; and he alludes to a curious painting met with on the north aisle wall of Horley Church, Banbury, where the staff or palm-tree is shewn snapping in twain beneath the weight of the Wondrous Infant; the legend on the scrolls forming a quaint English dialogue,* and a man being seen fishing in a river where fish are swimming about. Mr. Way also mentions other groups described by the late Mr. Dawson Turner with many interesting details.† At Shawell too, it has been observed that a group was discovered, displaying a gigantic St. Christopher, bearing the Infant across the rushing waters, and supporting himself with his staff —other personages being introduced—some employed in the various sports over which the Saint was patron, one of them with shoes of enormous length, sitting on a bank fishing.‡

The "party-colored Turbant," as Dr. Borlase calls it, on the head of the Bambino, at Ludgvan, is, of course, merely the regular form of "Sacred Nimbus, charged with red cross," which is constantly met with, distinguishing the figures of Our Lord (either in his human form, or that of the Holy Lamb), and which is even placed about the head of the Holy Dove.§

The "Priest carrying Host-Cista" is so styled by Dr. Borlase, as he tells us, from the tenor of the words on the label overhead. On this point of his interpretation, however, a doubt may fairly

* (To this effect I am informed). "What art thou that art so hevy? Bar I never so hevy a thynge!" "Yes, I be hevy, no wunder thys, for I am the Kynge of blys!"

† Gent. Mag., April, 1843.

‡ Gent. Mag., 1847, Vol. 2, p. 188.

§ In accordance with the "Filioque" Doctrine of Procession.

arise, for a very similar representation occurs in other pictures of St. Christopher; and, under the designation of "Hermit with Lantern," is even quoted as one of the emblems of the Saint.*

It was a Holy Hermit (so runs the well-known legend) who urged Reprobus, a man of gigantic stature, to abandon evil pursuits, and devote himself to the good work of carrying Pilgrims across a river, beside which was the anchorite's cell. Reprobus obeying, earned for himself the name of Christo-pher, (Christ-carrier), by bearing over, in the course of his labours, the Mysterious One described in St. John, i, 3, when the full weight of the world seemed unexpectedly to come upon his shoulders.† The Hermit was therefore commonly introduced as the companion and director of the stalwart Saint; and was sometimes referred to, as Mr. Way states, under the name of St. Cucufates.

It may not be too wide a digression here to notice the famous wood-cut, dated 1423, found in Germany, and so often reproduced in "fac-simile";‡ for, like the examples under consideration, it displays on one side of the great central figure of St. Christopher, a man with either a lantern or a cista, before an oratory door—(not a Cornish oratory we may presume)—apparently guiding the burdened Saint across the water, and as he seems to be inserting his finger into a small aperture in the front of what he holds, he must be either directing attention to the light, or opening an orifice through which it may stream forth, assuming that it is a lantern which he bears, and that his posture is significant. Should it be a cista, as Dr. Borlase would perhaps conclude, he may be pointing to the Host. On the opposite side a man is shewn toiling along under the weight of a full sack which he carries from the mill.

It may be, that a special meaning will manifest itself in connection with these two figures—making them accessories to the leading intention of the design, and in a manner, almost identical with it. On the one hand, the Grist-carrier may have been put in to afford a rough clue to the name, by a play on the word (Gristopher). On the other, an emblem of light upheld in the world

* Husenbeth's List, p. 31. St. Christopher, Martyr, *c.* A.D. 250.

† See Life of the Saint; Jacobus de Voragine; Golden Legend, &c.

‡ Chambers's Book of Days, Vol. 2, pp. 122-3; Illustd. Lond. N., 1844, p. 252, &c.

(Christ being the Light of the world) may have been intended—or the mediæval teaching was perhaps elaborated by the introduction of the Priest carrying the Body of Christ—(the Transubstantiated Host in its Cista or Tabernacle).

Each of the figures will then appear, in some sense, a Christopher; and the whole (according to the mind of the early designers) will have become a comprehensive and expressive symbol of the Christian Church.

In this light we know the great Christopher group was regarded. The Church was personified, struggling amidst the waves of this troublesome world to bear all in safety to a better shore—mightily upholding the truth, meanwhile, that Christ—come in the flesh—is the Divine Redeeming Lord.

But the masses of the people, knowing little of the real significance, would, on beholding the accustomed figures, very soon be led to invent some story or other connected with a particular man, to account for the appearances presented. A guiding Hermit, a reclaimed reprobate, &c., would thus be imagined, and tradition would grow. A certain Saint, named Christopher, would be shadowed forth as having actually carried the Infant Saviour across the stream, and, although impersonal at first, he would rapidly acquire a distinct individuality.

Thus the strange material anachronism of such a group would gradually become established.

Which of the two forms was originally adopted,—a lighted lantern or a host-cista, a comparison of the earliest examples would determine. There being a similarity of form between them, the one might easily have been substituted for the other by the ancient Artists.

With regard to the other devices, such as the fishing, the stealing of the fish, the hanging of the fox, &c., in the Ludgvan Fresco, we may suppose there were religious lessons underlying them, for instance—the commission or promise to the Apostles, "Faciam vos fieri *Piscatores* hominum—"* and a foreshadowing

* Over Bishop FISHER's Tomb, in the Chantry, which he built in the old Chapel of St. John's Coll., Cambridge, was THIS SENTENCE, and in the stall ends of the choir were a FISH and an EAR of wheat. "My Lord Cromwell commanded the same arms to be defaced and monstrous ugly articles to be put in their place." (Life of Fisher).

Fac-simile of the 1423 Woodcut of St. Christopher.

of the ultimate defeat of the crafty destroyer—united action on the part of the weak and easily deceived, conducing to successful resistance of the common foe, who would capture and consume them at will. Whether there is ground or not for such speculative views as the foregoing, which seem almost to flow from Dr. Borlase's expression, "The Host-cista," it must be allowed by all, that in the middle ages it was not considered irreverent or profane to produce the most grotesque combinations of things Sacred and Secular—often, a word—a name—or a deeper lesson, being set before the unlearned by means of some very far-fetched Pictorial Rebus.

Wall-Paintings recently discovered at Launceston and Cardynham.

SOME very clearly defined mural paintings* were found, not long since, in one of the Churches at Launceston. Mr. E. Vernon Collins, of Bodmin, has shewn me sketches of two of the subjects. One represents a Beast with curved and striped snout, climbing the crocketed (and otherwise elaborately decorated) arch of the piscina. A style of ornamentation seems to have been adopted resembling that observed by Sir John Maclean, at Trevalga;† pillars with their caps and bases, and some other patterns, being painted at the angles of the walls, windows, &c.

St. Roche is likewise depicted—in accordance with the legend commonly related concerning him. An angel is shewn approaching with a remedy for the Saint's wounded thigh, and a dog stands erect, holding forth a loaf in its mouth; while, enclosing the whole group, is painted an arched canopy with supporting side pillars. The figures appear to have been in a good state of preservation, when laid bare.

Cardynham Church also is now undergoing restoration. The Chancel being in course of rebuilding, &c., several interesting

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* Reserved for a future number of this Journal.

† *See* "Notes and Queries," 1872, Jan. 20, No. 212, 4th Ser., ix, pp. 52-3.

details have been brought to light during the progress of the work. Indications of Frescoes, too much injured by decay to be traced out, were beneath the white-wash on the walls. Windows and various recesses, sedilia, piscina, &c.,—long built up and plastered over, have been opened, reset, and will be retained for use.

Fragments of massive crosses, some adorned with interlaced Saxon-knot and mat-work, have been taken from amongst the stones of the walling. Tapered slabs and inscribed pieces of stone have also been disclosed.

The last-named appear to have formed portions of tablet-records. The letters are Lombardic capitals beautifully cut, between lines. The words are Latin: they mention the Church itself, and the name of the patron saint (Meubred), but are so much mutilated by subsequent adaptation* to purposes for which they were not originally designed, that few of the words remain entire. Many of the letters are conjoined—and one part of the Inscription seems to refer to the beginning of the 13th century. This will require further investigation and may form the subject of a short paper hereafter.

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* They have been cut to form uprights between the recesses of the Sedilia—and one piece, chamfered away, constitutes one side of the eastern-most arch.

W. I.

Feb. 10, 1872.

VII.—*Notes on some Inscribed Stones in Cornwall.*—*By* Rev. W. Iago, B.A., Westheath, Bodmin, *(L.S. of the Society of Antiquaries, London).*

HAVING in former communications* endeavoured to give correct readings of the Inscriptions on two old stones, (one at Bodmin and the other at Slaughter or Slovaens Bridge), both of which had long engaged attention and been regarded as objects of interest, I now proceed to lay before the Members of the Royal Institution of Cornwall, some observations which may tend towards the elucidation of others:—

THE PHILLACK STONE DECIPHERED.

The Inscription, hitherto undeciphered, on the rugged Monolith at Phillack is, without doubt, { Clotuali / Mogratti.

Mr. Blight, F.S.A., and Mr. R. Edmonds have both referred to it in their respective works† on the Antiquities of Cornwall—but no regular attempt to read it seems to have been made till now; for, the former remarks that it is "much worn" though "worthy of notice"; the latter, describes it as "apparently illegible." Mr. A. Paull has rightly recorded‡ that some of its letters are of the type, or form, usually denominated Saxon.

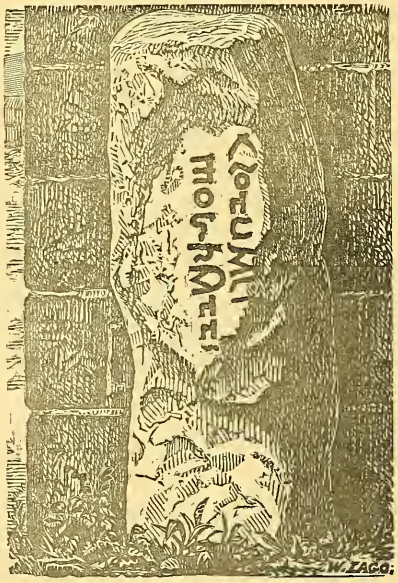
The Stone, Mr. Edmonds states, measures 7¾ feet in length, and was discovered in 1856—during the rebuilding of the Church, by the present Rector, Rev. F. Hockin—amongst the foundations of the South-Eastern corner of the chancel. With Mr. Hockin

* *Royal Institution of Cornwall Journal*, Vol. iii, pp. 103, 318, and Autumn Excursion, 1870, pp. xxxix, xlviii.

† *Blight's Crosses*, E.C., p. 129, and see *Hist. of Cornw.* (Lake) vol. iv, p. 69.
,, *List of Antiquities*, West C., pp. 10-11.
Edmonds's Land's End District, pp. 63, 207.

‡ List of Rubbings, laid before *Royal Institution of Cornwall. R. I. J.*, 1866, Vol. ii, No. vi, p. xii, Stone 11.

I have carefully examined it. From its general appearance and the position in which it was found, we may conclude that originally it stood somewhere in the vicinity, marking a place of early sepulture; that its massive proportions attracted the notice of those who were beginning to build the Church, and they, perceiving that it would be serviceable for the work, removed it from its site and imbedded it in the base of the sacred structure. There for centuries it lay forgotten; but now, once more erect, it stands—not far off—by a house in the churchyard, and, despite the vicissitudes of a thousand years, its time-worn legend can still be traced.



The letters are cut, in two lines, down the front of the stone.

The inscribed portion is tolerably smooth, and stands forward beyond the adjacent parts, which are rough and uneven. The lettered surface (now 29 inches in length by 17 inches in breadth) was perhaps formerly more extensive. It appears to have been cribbed and broken away till only the central portion (on which the words Clotuali and Mogratti are inscribed) remains. If, however, it be thought that no material diminution by a succession of

fractures has taken place, and that the inscription is still complete, it must be inferred that a small flat projection upon the face of the block was in the first instance deemed sufficient for a legend unusually brief. We then have to regard the monument as that "OF CLOTUALUS (AND) OF MOGRATTUS"—two persons;* or more probably as that "OF CLOTUALUS MOGRATTUS"—one person. But interpretations of a different kind also suggest themselves. It is rare to find on a monument of this class, two names assigned to the deceased.† The testimony of the majority of Inscribed Stones leads us rather to look upon the second name as that of his father who is not interred with him. The formula generally adopted supplies at least the additional word "filius" in one of its cases, so that we should expect to find "Clotuali fil.: Mogratti," or "Clotuali Mogratti fil.:" This last word perhaps has perished by the splitting-off of the surface, and the stone may have been erected "TO CLOTUALIS," or in memory "OF CLOTUALUS, THE SON OF MOGRATTUS." Dispensing with the word "fil.:" again for a moment, we may still find that the rendering just given is not far from the correct one. For the second name, if it be a British compound-word, Latinized, may consist of a prefix, the equivalent of "fil.:"‡ joined to the father's

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* For associated names grouped upon a single stone, see the example at Cuby Church, Tregony, described by Dr. Barham, R. I. of C. Journal, Vol. II, p. 47. Compare also the St. Hilary stone, on which there is no special signification of a paternal name.

† Respecting the possession of a plurality of names see the Inscriptions found at the following places. Fardel (now in Brit. Mus.), and near Roboro' Down, Devon; Langian, Wales; &c.; also these in Cornwall—St. Clements, St. Cubert, and St. Hilary (referred to above). In some of the instances the second name appears to be descriptive of the profession or occupation, *e.g.*, Medicus, Faber; while in the case of that at St. Clements, so well known, Mr. Longueville Jones has pointed out that the first word (read as Isnioc) is in minuscule characters little resembling in style the lettering of the words that follow. It has therefore been conjectured that the original burial was that of Vitalis, son of Torricus, the preceding name (Isnioc) on the higher part of the stone having been subsequently cut, together with the panelled cross-disc at the top. Every other inscribed stone in Cornwall gives but one name to each person.

‡ This idea is deduced from a casual remark made to me by Rev. Dr. Bannister, author of the "Glossary," when I shewed the word to him. He may not desire to be held further responsible for such an explanation; but however this may be, the theory receives support in some measure. See the examination further on concerning the derivation of the name.

name; "Clotuali Mo'—gratti," possibly standing for "Clotuali fil-Gratti." The inscription would then refer to "CLOTUAL, SON OF GRATTUS."

Lastly, should Mogratti admit of this division into component parts with such a meaning, "fil" may after all have been used with it, as previously supposed. "Clotuali Mo'-Gratti fil:" would give us three links of a chain of pedigree—"Grattus, Mo'grattus, Clotual, appearing in direct descent. If this be so, the stone, we may consider, marked the last resting place "OF CLOTUALUS, THE SON OF GRATTUS'S SON." But we may now be passing beyond due bounds. It remains for us to enquire to what age and nationality this memorial stone should be ascribed; and also, to what undisguised form the names are capable of being reduced.

On these points the style of the words and the manner of their cutting will afford some clue for our guidance. Distinct identification may not be possible; for, during the few centuries just prior to the Norman conquest, so frequently did the chieftains, religious teachers, and other inhabitants of Cornwall, Brittany, Wales, and Ireland, migrate from one locality to another, that to fix upon some who are mentioned in the scant historical records of those unsettled times, as commemorated by the names upon these stones, is generally hazardous—even when the names appear to be the same—unless there be some strong confirmatory evidence, or distinct probability in the case. Many, at or about the same dates, bore names in common: either as indicative of like pursuits, aims, ambitions, good qualities, or peculiarities, or else in compliment to relatives or illustrious personages for whom some special admiration was entertained.

As to the actual incisions on this stone, the lines are well kept and the letters are small; they range (according to a certain system) from $1\frac{3}{4}$ in., to 4 in., in height. Ten different letters are made use of—several of them recur (invariably in the same form), and not one of them is at all doubtful.

A, is met with twice; being in the midst of each word, and disproportionately large compared with the other letters. It is rounded above and has indented cross stroke. In the upper line this letter is broken so as to appear almost like an M. In the lower line it is complete (and m is found to be of a very different outline).

C, { commences the Inscription and is formed of two slightly curved lines crossing at their intersection.*

G, { is almost of good Roman form—but has a foot prolonged forward.

I, { terminates each word and is feebly cut.

l, { is also twice introduced, both times with drooping foot.

M, { is a rectangular trident, commencing the second line.

o, { in each word, is small and circular.

R, { has the main back-stroke rising above the head of the letter, and the foot is projected.

t, { occurs thrice—with straight flat head, and the stem turned forward below to form a foot.

U, { is rounded.

From these characteristics it will be understood that for the most part the letters are of the style which prevailed† during the Saxon period. They much resemble the Erse or Irish. Some appear of older form. The age to which these letters belong, seems to be from the 6th century to the 9th, and an examination of the names themselves brings us to the same period, as will presently be shewn.

Philologists may be able to tell us that these two personal names possess characteristics which they can clearly recognize. Yet it may be expected that any probable derivations which have been already thought of, should be stated. In entering upon this question I would remark that the names, by their style, recal to us others which were in use from the 5th to the 10th centuries. The fashion as well as the formation of names kept pace of course

* Letters formed thus of overlapping lines occur at Lustleigh, Devon, (see Lysons); and on the Castle Dôr and Cubert Stones. The general resemblance of the Phillack letters to those on the (more recent?) Camborne altar slab is also striking, and very similar letters may be seen in the "Catamanus Rex" inscription, Anglesea (*Cambrn.*: *Archl. Jl.*) and on the stone raised by Samson to King Juthahel, &c., at Lantwit. (*Sharon Turner's Hist. Ang. Sax.*, vol. iii, p. 366. *Galignani's Editn.*, Paris, 1840).

† Learnt from the Roman Missionaries. (*Sir F. Palgrave's Hist.*: *Angl. Sax.*, p. 124, 1867 *ed.*).

to some extent with the variations of language. In the case before us, the Celtic (as represented by the Gaulish, Cornubo-British, Welsh, Gaelic, &c., dialects) is probably the source to which we should look for a solution of the words rather than to the Teutonic or Gothic; but in an enquiry of this kind we must not confine ourselves within too narrow limits.

The letters so clearly shew the words to be *Clotuali* and Mogratti, that we see at once, both are proper names. We therefore cannot regard them as signifying *The grave*—of Mograttus; although in a manuscript of the old Cornish language ("Passio Christi," 15th cent.:) we encounter a word,—apparently somewhat similar to the first,—with this kind of signification. The expression being * "*Cladhva* Crystunyon" "*Burial-place* for Christians."

The Rev. J. W. Murray, in reply to an enquiry, tells me that he considers the name Clotual may contain some reference to Glory or Renown. This is not unlikely; and Clotual or Clotval may be meant for a British name like Clodwal. It reminds us also of Clodoaldus, Clotmârus,† &c. Dr. Borlase compiled from

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* (Rev. R. Williams's Cornu-Brit.: Lex.:)—Cladhva,—a burial place; same in Welsh (from Cladhu,—to bury; and Ma,—a place). Compare Cledh,—a trench, ditch, (pl. Cledhiow) Welsh, clawdh, clad; Irish and Gael.: cladh.

† (Rev. Dr. Bannister's Glossary of Cornish Names) Clode, (famy: name), perhaps from Clod,—praise, fame. (Cornu-Brit: Lex:) Clôs,—glory, happiness, praise; Welsh, Clôd, Clot (obsol); Irish, Clodh, Clu; Gael:, Cliu. Compare the Sanscrit (from Cal to proclaim), the Slav:, &c., Gr: κλυτὸς; Lat., in-clytus. See also (Cornu-Brit:) Clor,—glory, beauty, renown. Arm:, glôar. The Gaulish name Clotomârus, is same as Welsh Clodvawr (Clotmawr) great renown; O.H. Germ: Hlodomâr. From all this it will be seen that Mr. Murray's conjecture is probably correct. I think that the Gododin of Aneurin (6th cent:) quoted by Sharon Turner (Vindic: of Anc: British Poems) will further illustrate this. I there find the Son of Clydno thus apostrophized.

". . . . . .
Mab Clytno clothir canaf y ty
Or clot heb or heb eithaf."
["Son of Clydno! of extended fame, I will sing to thee
Praise without bound, without end."]

But see, likewise, less probable derivations, (Cornu.-B. Lex.)—Cledhe,—a sword; Welsh, Cledhyv, Cledif; pronounced cledha in some places. Irish, Cloidheamh, Claideb, &c. Also the word Cledh,—left or North (just as Dehow, is right or South); Welsh, Clêdh; Gael: and Ir: Clith, Cle, &c.; Goth: hlei. Val, was frequently used as a termination, and its meaning seems quite clear; see Cunoval (on the Mên Scryfa), Rioval, &c. Some writers tell us that Gulval took its name from Gudwal, a British Saint of the 6th or

Harding, Powell, &c., a List of Early Chieftains and Kings. We may suppose he did not place too much reliance upon it; but whether it be of any great value or not, it does not supply us with the exact names we are in search of; the nearest, perhaps, being that of "Cloteius or Clotanus, King of Cornwall."*

None of the serfs freed at Bodmin, between A.D. 940 and 1020† appear to have been called by such a name as Clotual.

In the neighbourhood of the Phillack Stone are the remains of the ancient oratory of St. Gothian or Gwithian on the sandy shore. I have therefore been careful to observe whether the first word of the Inscription could be read as Gotuan instead of Clotuali, but I find that it cannot.

Mogratti.—This word has already been partially dealt with; a portion of it having been assumed to mean—"Son of." In support of such an interpretation may be cited the remarkable fact, that, in this class of inscriptions, we so frequently find a name beginning with Mac, Mag, or Mog,—placed *last* on the stone.‡

This seems to shew that the original paternal name was often so adapted to use (by having Mac§ added to it) as to become

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7th century, Bishop of St. Malo, and Conf. St. Gudula, V, A.D. 712, also occurs, and St. Cleder (Clether). Cletus or Cletius, it is said, was Pope and Martyr, 1st century. The following names are well known. Clovis (chief of the Franks, 481), originally a heathen; he subdued all France (except Brittany) and died (1st king) 511. St. Clotilda or Clotildis (a Burgundian) his Queen, d. 545. Clothaire, 558. He burnt alive his rebellious son, with wife and children, and was uncle of St. Cloud or Clodoaldus, Bp. and Conf: 560. Clodulphus or St. Clou, Bp. of Metz and Conf: 696. (One of these saints, it is stated, was chosen—on account of his name—to be Patron of the Cloutiers or Nailsmiths). St. Claude Arch-Bp. of Besançon, and Conf: 696 or 703. We might also allude to the connection capable of being traced between some classical forms of words, like these, their roots and varied developments—Claudius, Clodius, &c.; as well as a few Greek words; and the modern close, cloud, &c., clotûre, &c., (Eng. and Fr.).

* Dr. Borlase gives besides,—The last King of the Britons, "Cadwallader fil: Cadvallon, Cadwallo, or Cadwal." (These names being compounded of Cad, *i.e.*, war, will not suit our requirements for the first syllable).

† Wallis's Bod: Reg. p. 388. List of Manumissions in Gospels-Book. (Brit: Museum).

‡
- .... Mogratti (Phillack).
- .... Magari (Sl. Br. Worthyvale.)
- .... Maquirini (Fardel, Devon), (Brit.: Mus.:)
- .... Maccodechet: (Buckl.: Mon.: Devon.)
- .... Maglagni (Llanvaughan, Wales),—&c.

§ Compare the Highland-Celtic, MacCullum Mhor, &c. Macnab, Macvourich, also the names MacAndrew (Anderson); McIan (Johnson), Ian

descriptive of the son's descent—when appended to his name. This British arrangement may have been complete in itself, *è.g.*—Kenneth MacAlpin (A.D. 843, Scotland); and the introduction of the Roman "fil:" may in some instances have produced a redundancy—unless, (as we have already surmised) allusion was incidentally made to an ancestor more remote, whose name descended in that involved manner to his posterity, represented in the person of the father of the deceased.

We may yet be driven to seek for some other exposition of the word—but in any case we may presume that names like Mogred, Magrath, or Macraith (a Welsh Patron Saint),—however they originated,—might, by being Latinized, easily assume the form "Mograttus."*

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being Gaelic for John; In Irish-Celtic also we have MacCarty, Maguire, &c., and the still shorter 'O' genealogically used (in O'Connor, &c.,) for the "Son of." On the Irish Ua, O, see "Christian Inscriptions," (ed: by Stokes), pp. 29, 33, now being publd., Dubl. Univ. Pr., for the Royal H. and A. Assocn. of Ireland. It has been affirmed that the word—as used, of old—was Mo, O, Ma, or Mac.: according to circumstances. (see White's Hist. Gt. Brit. and Ir., p. 70.) We find the following given (Cornu-B. Lex). Mab,—a son; (Cornish Vocab.:) "filius."; Welsh and Armoric, Mâb, Mâp; Ir: Gael: and Manx, Mac. Its Welsh form, even declined to 'Ap, or 'P thus—Howel 'Ap Rees ('Price), a Prince of Wales in the 9th century.

* Dr. Bannister (Glossary) gives Mag,—a brood. He also quotes, from the Bodmin Manumissions, Macurth—and supposes that Macraith and the modern Mackworth may be varieties of the same name. He thinks that the proper names Maker or Magarus, Machus, and Maccos may be traced to a word meaning greatest; or to the Greek μακάριος blessed. Macleod and Dewar (in their Gaelic Dict.) have given Mog,—clumsy paw or hand; mogur,—bulky; Moighre,—stout, handsome man. Williams (Corn-Br. Lex.) has Mocha, Mochya, Moy, &c.,—most or much; and grath, grayth, gras,—grace or favour; Welsh, rhâd, Lat. gratia. If Moy and Grath were to be combined, probably the adjective would follow the substantive—therefore we can scarcely accept this as the derivation of Mograttus. Such a name however as Grath or Rhad, (White mentions an early Scottish King Wrad) might, with prefix Mab or Mac,—become Mograttus. This result might also attend the blending of the same prefix with one or other of such names as are referred to by Dr. Barham in the Cuby pedigree, *e.g.* Geraint or Gerrans, Garwy, and those that can be changed from Vor to Gwr; like Gwrtheyrn—Vortigern. (*R. I. of C. J.* vol. ii, p. 52.) In the poems of Aneurin we read Garadawc for Caradoc, and the Bard appealed to Gwriat as having witnessed a battle he was describing. We can perceive how easily, with Mab or Mac for a prefix, either of these when Latinized would also produce the name Mograttus or something very similar to it.

Dr. Borlase refers to "Coelus fil.: Mayrici" amongst the chieftains, and also "Moduncius (Dunwallo) fil.: Cloteii." Saints' names—Mochœus, or Mochtus, and Macallius or Maughold, (Manx), also are met with—but the legend on the Phillack Stone cannot be read otherwise than as Mograttí.

It has been alleged that the Saxon style of letters could scarcely be in use in Cornwall till the time of Athelstan—10th century; but letters of this kind exist in South Wales (Glamorganshire), on Samson's "Juthahel Stone"—considered to belong to the 6th century, and the Phillack coast was within easy reach* of both Wales and Ireland. Some of the Phillack letters appear older even than Samson's. They do not seem so ancient as some of larger size on the other Cornish pillars, but the inscription seems to be earlier than the Alroron and Doniert (872) period. Older also than the Inscription on the Leuiut Altar Stone to which its letters bear most resemblance. The three last referred to are ornamented, and the A upon them is less rude. It therefore appears to me, according to the only evidence we possess, that the rough Monument at Phillack—displaying the names of Clotualus, and Mograttus,—may be assigned to the Period from the 6th to the 9th centuries.

[The drawing on wood which I have introduced as an illustration is from a sketch which I made after careful examination of the stone, and from a photograph subsequently given to me by Rev. F. Hockin, the Rector. As a further guide to accuracy, rubbings have been taken by Mr. Hockin and myself. Mr. Paull also has kindly allowed me access to those in his possession, for the purposes of comparison.]

"MEN SCRYFA," MADRON.

(Crosses on it).

This venerable relic was inspected during the Autumn Excursion (p. xcix).† Its Title almost claims for it pre-eminence as THE Inscribed Stone of Cornwall; even the land about it seems to have

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* Anno 892. Three Scots (Irish) came in a boat without any oars from Ireland, whence they had stolen away because they desired for the love of God to be in a state of pilgrimage, they recked not where. The boat was made of two hides and a half. They took with them provisions for seven days. About the seventh day they came on shore in Cornwall, and soon after went to King Alfred. (Sax. Chron. &c.). They were named Dubslane, and Macbeth or Macheathath, and Maelnimuin. (Chr. Inscr.), p. 40.

† Soon after the Cornw. Royal Instn. Excursion, the President (Mr. Henwood) kindly gave me the opportunity of examining, with him, the

been named from it* in the Cornish language, another proof of its ancient character.

Many generations have regarded it with interest; and the present proprietor, with the best intentions, but with misdirected zeal, prepared it specially for the visit of the Members and Friends of the Royal Institution of Cornwall, by coloring its letters blue!—where he could trace them. Fortunately the incisions appear to be uninjured, and some of them had altogether escaped the painter's observation.

Gulval and St. Hilary Stones. These call for some special remark, as do also others of which I have lately taken rubbings, viz:—the stones at Hayle (Carnsew), Cardynham, St. Blazey, Castledôr, Indian Queen's, Castle Goff, Long Cross, &c. Sir John Maclean is publishing accounts of the two last named, in his *History of Trigg Minor*—one is now in the Press (see Endellion).

Of the Rialton Stone, a large and well-executed drawing by Miss A. Shilson (confirming C. S. Gilbert's and Mr. Paull's reading—*R. I. J.*, Vol. ii, p. 365)—has just appeared in the "*Ilam Anastatic Society's Journal*," (published at Cowell's, Ipswich). In the same work (and former numbers of it) are other illustrations of Cornish Antiquities—*e.g.* remarkable stones, hornpick, Penryn goblet, &c., and a full-paged representation of the Mabe Alabaster.

* "Gunmenscryfa," in Madron.—"(Gwon) The Down, of the (Maen) stone, (Scryfa) inscribed." [*Bannister's Glossary*]. "Gun, Gôn, Goon, a Down or Common. [*Williams's C. B. Lex.*].

A close examination and a rubbing of the stone convinced me that the inscription differs in some points, though not very materially, from the generally received account of it. The F, appeared thus ⅃—upside-down.* In former illustrations of the stone I have seen it given non-inverted, of quite a different shape, and curved over to meet the top of the I. Dr. Borlase has so represented it,† and others have followed his example. He has also stated—"Mr. "Moyle thinks that Rialobran was a heathen. It is true that "there is no cross at the beginning of the Inscription—I rather "think it a Christian Monument erected probably before it be-"came usual to place the cross before the name." Notwithstanding this declaration, we at once perceived on visiting the stone, large crossing lines in the early part of the inscription. Dr. Barham and Mr. H. M. Whitley saw them with me. In the rubbing they distinctly appear. They are somewhat peculiarly placed,‡ but have the same appearance of great age which characterizes the letters.

I have sought to ascertain whether the cross-markings could have been added since Dr. Borlase published his interesting account and engraving of the stone in 1754–69.—I find that they must have existed in his time: for, Martyn§ published (in his second-sized map) 20th April, 1749, in advance of Dr. Borlase, a sketch of the stone displaying these very marks—He also "dotted-in" the F, as being of a form he could not quite understand.

Dr. Borlase, then, rightly expected to find a cross at the commencement of the inscription, but overlooked or failed to recognize anything of the kind. Nevertheless, the marks were there, and still remain, not as interpolations, but as having been, apparently, *scriven* when the letters were.

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* So painted, but perhaps not really so cut—judging from the Rubbings.

† *Antiquities of Cornw.*, (Borlase), pp. 391, 394. *Land's-End Distr.*, (Edm.), *&c.*

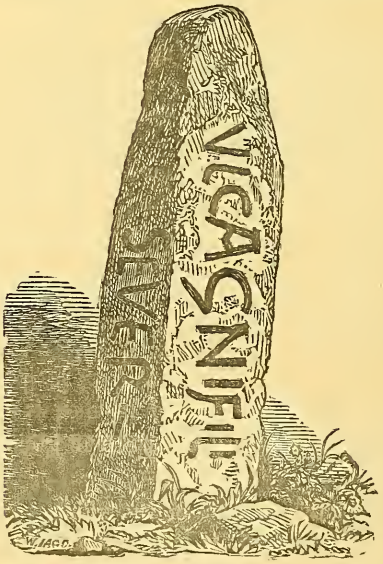
‡ See figure which I have drawn from rubbing, sketch, and photograph.

§ *Wallis's Bod. Reg.*, pp. 106, 344, and *Cornw. Reg.*, pp. 117, 118.

THE ST. BREOCK STONES.

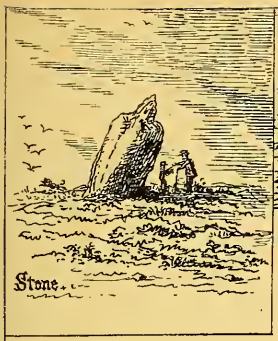
Mr. Christopher Cooke has lately announced * that the ancient Burial-kist known as "Druid's Altar," in St. Breock parish, seems to have disappeared. This, I am happy to state, is a mistake. The stones are well-preserved and form a most imposing group,† the covering stone being of great thickness. In the same neighbourhood I saw several large Barrows, and the Menhirs, "Stone" and "Great Stone"—on commanding sites upon the Down; as well as the slab which Mr. Cooke (perhaps rightly) calls the top stone of a Cromlech.

At Nanscowe, in this parish, is an Inscribed Stone—not until now, I believe, figured in any Cornish work. I have therefore made a sketch and rubbing of it to illustrate this paper. The letters run to a large size (being from $3\frac{1}{2}$ to 8 inches high), they

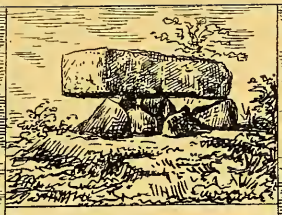


* *Antiquary*, Vol. ii, p. 35, Feb. 10, 1872, &c.

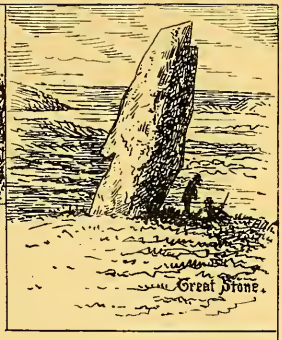
† Frontisp. of *Warner's Tour through Cornwall*, 1808, and pp. 322-3. See also Mr. Whitley's notice of it, with Plate, *R. I. C. Report* 1840, p. 30.



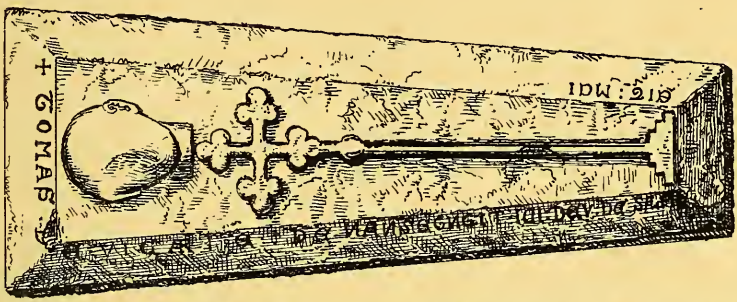
Stone.



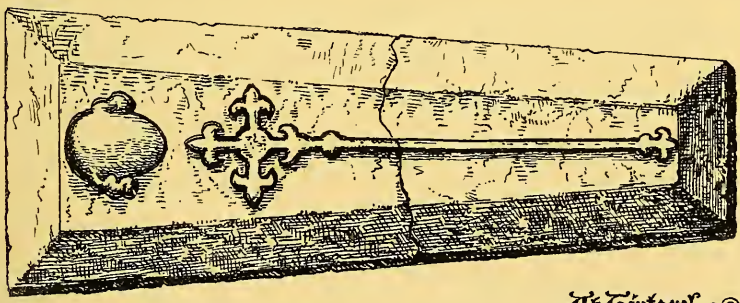
At
St. Breock



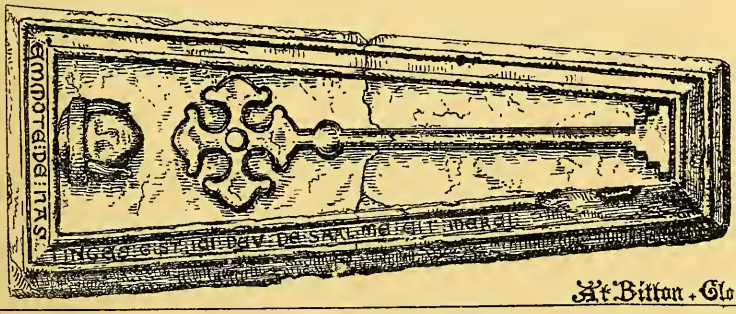
Great Stone.



+ TOMAS DA VICARIE: DE NANSEGN: GIT: ICI: DEV: DE SA ME GIT: MCI. [*Vicary of Nansegn.*]



At Tintagel.



At Bitton. Glo'.

[W. Lago.]

Inscribed Stones.

are of early type, boldly cut, and resemble exactly those on the stone at Llanvaughan (Wales), which contains Oghams in addition.* I have the following notes respecting the Nanscowe Stone.† "A sketch was presented by Mr. Whitley, of an inscribed stone "about 5 feet high, of granite, at the Mowhay gate, Nanscowe. "The inscription VLCAGNI FILI SEVER—." Mr. Kent had "written to Mr. Whitley that a similar sketch was communicated "by him to the Secretary of the British Archæological Associa- "tion, and was published in their Journal for March, 1845. Mr. "Kent, in a letter to Dr. Barham, described it as the stone of "'Ulcagnius, filius Severi'—a Roman or Romanized Briton— "cremation had been used." It is to be observed that the inscription occupies two adjacent faces of the stone.

I will close this paper with the Norman-French legend (probable date about 1350), upon the slab (shaped as a coffin-lid) in St. Breoke church, shewing also how similar‡ in design the stone is, to that at Tintagel, and to another at Bitton in Gloucestershire. Slabs of the same character, but without the head, occur at Buryan, Bodmin, &c. The Rev. Canon Rogers and Mr. Kent were perplexed by the Inscription.§ The former surmised that it commenced with "Gomapre," the latter "Homapre"—for "Humphry"; and the History of Cornwall‖ (Truro), gives it as "Tomap-e, &c." The real name is "*Thomas* Vicary;" the actual words being

" + Tomas de Vicarie, de Nansetn, git ici, Deu de sa alme eit mci." for,—

" + Thomas Vicary, of Nansent¶ lies here. God have mercy on his soul."

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* Inscribed. " Trenacatus ic iacit filius Maglagni." The Ogham being " Trenaccat: &c." The form of the letter G is the same on this stone as on that at St. Breoke.

† *Royal Inst*: *of Cornw*: *Report*, 1856, p. 25, and 40*th Rep*: p. 24, *&c.*

‡ See Mr. H. M. Whitley's paper, p. 47 of this present *R. I. Journal;* also, *Boutell's Chr*: *Mts*: pp. 133-5, and the annexed Plate.

§ *R. I. of C.*, 27*th Report*, 1845, *Ap.* v, p. 32.

‖ Vol. i, p. 126.

¶ St. Breoke was formerly taxed under the name of Powton, Nansen, Nansent or Lansant. Many Churches were referred to under the names of the Manors. *Dr. Oliver's Mon:* p. 436, *&c.*

W. I.

VIII.—*Earthwork in Northcot Hamlet, Devon.*

AT the Meeting of this Institution in the Spring of 1870, notes were read and a sketch plan exhibited, from Mr. Coode, of Polapit Tamar, Launceston, concerning an ancient earthwork in Northcot Wood, on the east bank of the Tamar, in Northcot Hamlet, Devon; of which, we believe, no mention is to be found in any History of Devon, or other published work.

We publish, annexed, a lithograph copy of the plan furnished by Mr. Coode, concerning which he states that the river and boundaries are taken from a plan and are accurate, but the red lines representing the foss and sunken road are put in from ocular observation only. The ground slopes precipitately down to the Tamar, and steeply to the little rivulet at A.B. which falls into the Tamar. There is no present appearance of either ferry or ford, though the sunken road seems to lead to the river, which, however, is not easily fordable at that point, unless in dry summer weather. The ground towards C rises rather higher than the earthwork. The red lines represent the now remaining portions of the ancient works; and the outside embankment is quite as apparent and unmistakeable, as far as it goes, as the inner oval. The ditch varies in depth from five or six feet to nine or ten. Whether the outside embankment ever extended all the way round, Mr. Coode could not say; but it was the opinion of persons who viewed it with him, that the road next the bend in the Tamar runs along the old ditch. The ground is very steep there, and also on the south-eastern side. The whole is covered with oak coppice, and when that grows up, is of course quite invisible except to persons actually in the ditch.

PLAN OF EARTHWORK
IN
NORTHCOT HAMLET, DEVON.

LANE LITHO: TRUED.

IX.—*Upton Castle.*—*From* S. R. Pattison, F.G.S.

A WINTER Morning's walk enables me to give a slight account of a ruin, of which, I can find no mention in the few works to which I can conveniently now refer.

The Farm of Upton, in the parish of Lewannick, belonging to F. H. Rodd, Esq., extends from the Bodmin road near the Lodge, to the river Lynher which divides Lewannick from Alternun at the foot of the moors. The valley of the Lynher is here densely wooded. On a knoll in a flat bend of the stream, in the midst of the wood, stand the ruins to which I desire to call the notice of some person possessed of more leisure than falls to my lot. The knoll is a natural boss of rock, scarped and filled so as to be free on all sides. On its summit is an oblong inclosure surrounded by a wall of stones evenly laid (*i.e.* with evident facings on both sides), but without any mortar. Around this is a shallow ditch and a distinct formidable walled parapet on the edge of the mound. Between the walls of the inner and outer enclosures there are, on one side, the remains of chambers; and on the side of the dyke nearest the flat portion of the valley, there are the remains of a gateway and covered way. There are also traces of foundations, and made ground, in the little plain below. The aspect of the whole is that of a small keep without any outer defences or inclosure. If there were an outer court I failed to detect any remains of it. I could not perceive amidst the tangled underwood and under the grey lichens any cut stone, or any door or window places.

The position is commanded from all sides and therefore cannot have been a military post. It is just such a defence as might have been erected to protect the possessions of a group of villagers in huts; or an establishment for smelting. The vicinity of tin streams on the river above, and the abundance of wood, may guide in searching for the traces of smelting operations here. I have recently seen, in the mountains between the Spanish province of Huelva and Portugal, the marks of small earthworks,

near mines and heaps of slag, dating from the early Roman dominion in Spain. The whole subject of this early ruin, so distinctly shadowing forth the elaborate mortared castles of later date, and so distinct from the Cyclopean work of still earlier days, is well worth investigation. My stay in the district did not permit more than a very cursory visit, and I send this note in the hope of its leading to fuller research.

S. R. PATTISON.

February, 1870.

Mr. RODD, of Trebartha, writing at about the same time as Mr. Pattison, says:—Nobody has been able to give a satisfactory account of Upton Castle, as it is called. It is formed of loose stones, probably brought there by hand, the size of each not exceeding, in a general way, that which a man can carry. It stands in a Coppice Wood on the banks of the Lynher, in a deep valley at the foot of Ridge Hill, a northern link of the Caradon and Cheesewring chain of hills. The basis of this eminence appears to be natural, and the stones an artificial superstructure, forming a vallum and a keep, with an entrance thereto. It could, however, scarcely have been a fortification; its low position not admitting of its corresponding with any other encampment. —. —. used to say that it was formed as a keep or protection for sheep against wolves, at a time when England was infested by those depredators; and it really seems adapted for nothing else. It is certainly a curiosity, and, being on my property, I regard it with interest and as worthy of all protection.

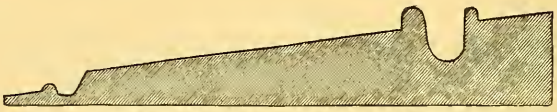
X.—*Notes on some Antiquities in East Cornwall.—By* R. N. Worth, Plymouth; *Corresponding Member of the Institution.*

Read at the Spring Meeting, May 23, 1871.

I HAVE to lay before the Members of this Institution a few notes on some Antiquities in East Cornwall which have recently come under my notice, and respecting which I am not aware that any precise record exists.

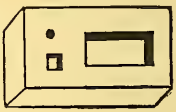
The first is an ancient Camp on Tokenbury Hill, near the Caradons, about five miles north of Liskeard. It is not one of those described by Mr. M'Lauchlan. This Camp, which is known by the name of Roundaberry, lies on the northern slope of the hill, near its summit, and commands an exceedingly extensive prospect. It is an irregular circle, and includes an area of about two acres. The entrance is near the highest part, and faces almost due west. On either side of the opening is a huge stone post, the upper portion of which appears to have been rudely wrought, as if to receive a lintel. In the construction of the Camp advantage has been taken, in a somewhat peculiar way, of the natural slope of the ground. The defences towards the breast of the hill upwards, consist of a rampart, from 6 to 9 feet high, succeeded by a ditch, averaging 9 feet in depth, and about a dozen feet in width, with, on its outer edge, a further small rampart. At the lower end of the Camp the area is not protected by any raised earthwork. The hill has been cut away, so as to present an almost perpendicular face to any one approaching from below, and the resulting ditch has been made somewhat more formidable by the raising of a low rampart on its outer edge, as at the higher part of the Camp. These two systems of defence, the raised and the excavated ramparts, somewhat overlap each other at the sides of the enclosure, which would have been poorly defended if they had simply met.

A horizontal section from north to south will perhaps more clearly indicate the form of these earthworks than any mere description.



The ditch and ramparts are now in most parts overgrown with trees. They are complete, except at two points, where they have been interfered with by mining operations. On the hill above is a long barrow. I should add that the proprietor of the estate, Mr. S. Eliott, of Plymouth, takes the most sedulous care for the preservation of these interesting remains.

The other matter to which I desire to call the attention of the Institution is the evidence of ancient smelting operations in the valley which runs from Temple Church towards Warleggan. Traces of streaming are discoverable from one end to the other; and recently in constructing clay works two of the stone moulds used by the old smelters were found. They present no peculiarity; one is here figured.



I wish, however, particularly to refer to the remains of an old streamers' village, on a tenement called Lower Hill House, the property of Mr. Bate. Here the foundations of several huts may be traced, probably constructed, as the modern clay-workers in the same valley have constructed shelters, of a foundation of stones and a superstructure of turf. The most interesting feature is the old smelting-house, the furnace of which is still in part intact. The house is circular in shape; and immediately opposite where the entrance once was is the smelting place, circular also and built up of granite, which has been reddened and partially disintegrated by the action of heat. Pieces of slag, and occasionally of metallic tin, are found on and near the sites of these smelting-houses, of which there were certainly at one time three in the valley within a comparatively short distance of each other. I should add that I am indebted to the Rev. C. M. Edward Collins, of Trewardale, for having called my attention to the existence of these remains.

XI.—*Note on a Sub-Marine Forest at Market Strand, Falmouth.*—*By* H. Michell Whitley, C.E.

Read at the Annual Meeting, Nov. 14, 1871.

In September, 1871, during the progress of the works for the erection of a landing pier at the Market Strand, Falmouth, in excavating the foundations, the remains of a Sub-Marine Forest were discovered.

The Section shewed first a layer of sand, two feet in thickness, resting upon a thin bed of shale thinning out towards the Sea; below this was the Forest Bed, which was about seven feet thick, and its top, when excavated, was about the level of low-water mark, ordinary spring tides.

The Forest Bed is composed of compact Peat, seven feet thick, and under it, resting upon the rock, was a layer of gravel, four feet in thickness.

The Forest consists principally of the remains of flags mixed with ferns; the greater number of the trees were of small size, few being above twelve inches in diameter; they were chiefly Hazel, Oak, Fir, but the Beech and Birch were also abundant.

There were no Hazel nuts discovered.

The appearance of the Forest Bed suggests the supposition that the Forest, or rather the coppice wood, gradually sank until it became a Marsh, when the flags mentioned above grew abundantly; then, as it sank deeper into the water, the layer of sand overlying it was deposited.

The adjacent open space before the Market is called the Moor, and I was informed that this Forest Bed extends up this valley for a short distance. Another portion of this Forest was seen in an excavation at the Bar pools.

This discovery adds another to the many points along our southern coast at which the remains of these Sub-Marine Forests have been discovered; and we may infer that this ancient Forest grew not only around the open coast, but also extended up the estuaries of the various rivers, and that the coast line of ancient rocks was at that time much the same as at present.

XII.—*Note on a weapon of Stone found in a stone barrow at Pelynt.*—*By* JOHN EVANS, F.R.S., F.S.A.

Read at the Spring Meeting, May 23, 1871.

THIS instrument, remarkably convex on one face and slightly concave on the other, rounded in both directions at the broader end, and brought to a blunt rounded point at the narrower, appears to occupy an intermediate position between a battle-axe and a mace or fighting-hammer. It differs materially from the more ordinary forms of stone battle-axes found in Britain, and indeed from those found in other countries of Western Europe, in presenting this pointed shape at one end instead of the usual axe-like edge. It is true that in most cases this edge is not sharp but rounded over, but it is still an edge rather than a point. This blunting of the edge, and, in this instance, of the point, has evidently been purposely effected, probably with a view of preventing accidental injury to the warrior who carried the weapon, while its deadly effect on an enemy would not be diminished by the edge being of a crushing rather than of a cutting character.

The instruments most nearly approaching in form to this Cornish specimen are, I think, some of those from Scandinavia, of shorter proportions than Worsaae's, Fig. 103, which are occasionally ornamented with chevron lines on the convex face, and appear to belong to the Bronze Period. They have, however, a narrow edge at the pointed end.

The inner or concave face of the Pelynt axe so closely resembles that of the stone battle-axes, convex on both faces and rather expanding at the cutting end, such as have been frequently found in barrows in Yorkshire and other parts of Britain, that when this face only is seen the weapon might be mistaken for one of this form. It is therefore, barely possible that originally it may have been of this character, but that having in some manner been

damaged on one face it has subsequently been re-worked into its present exceptional form.

Like the majority of such instruments in this country, it probably belongs to a period when bronze was already in use for the smaller weapons; and the discovery of a bronze dagger with rivets, in a barrow in the same field, as recorded by Mr. Couch, tends to corroborate this view.

XIII.—*On an Extraordinary Phenomenon in the Waters of the Mediterranean.*—*By* RICHARD EDMONDS, *Plymouth.*

Read at the Spring Meeting, May 23, 1871.

THE following account of this hitherto unexplained phenomenon was lately given to me by Mr. Mitchel Thomson, Staff Surgeon, R.N., a good observer, who, when his ship was stationed in the Mediterranean some years since, visited the spot of its occurrence and personally ascertained the fact. With his permission I now communicate it to this Institution.

In the island of Cephalonia, near its capital and its harbour, there juts out into the sea a low piece of land about a furlong in length, tapering to a point. At this projecting point the sea has been continuously and immemorially flowing in on this small slip of ground and running in a channel about 25 feet broad and three feet deep through its entire length, until it disappears under a hill and never afterwards re-appears.

On the spot where this constant influx of the sea commences, a mill has been erected with an undershot wheel about 20 feet in diameter, which is always at work by means of this fall of water.

The problem for solution is, what becomes of the water thus incessantly descending and disappearing beneath the surface of the island. Some have thought, as the island is in a volcanic district, that the water is either converted into steam or decomposed into its constituent elements.

A more probable explanation presented itself to me whilst perusing the *Report on Deep-Sea Researches* by Dr. Carpenter and Mr. Jeffreys, read before the Royal Society in December last and printed in its Proceedings (vol. 19, No. 125, pp. 146–221), in which it is shown that whilst an *upper current* from the Atlantic is always flowing through the Straits of Gibraltar, *into* the Mediterranean, an *under current* (salter and denser) is always flowing *out* through the same straits. I consider therefore that the Cephalonian stream, after its disappearance, descends in the interior of the earth to the depth of the *under current* of the Mediterranean, with which it then unites and is carried along with it towards the Straits of Gibraltar—thus keeping the mill stream continually flowing from the surface of the Mediterranean.

Extract from "*Smyth on the Mediterranean Sea*":—

There was much talk about a current in Port Argostoli, which the Cephalonists believed to flow uniformly against the wind "owing to subterraneous caverns." It is, however, but an effect of the form and contour of the harbour and its vicinity as acted on by winds in heaping and heading up the waters of one arm and draining them off by the other.

Foot Note, p. 184.

XIV.—*Notes on the occurrence of Cobalt in connection with the Tin Ores of Cornwall.—By* RICHARD PEARCE, F.G.S., *Member of the Institution.*

Read at the Spring Meeting, May 23, 1871.

SOME time ago I had occasion to examine a sample of dressed Tin Ore, (Black Tin), from Dolcoath Mine, and was rather surprised to find that it contained a very appreciable quantity of Cobalt. No correct determination of the quantity was made at the time, but from the reactions, I should judge that it could not have been much less than 0·5 per cent.

Cobalt ores have been frequently met with from time to time at Dolcoath, but under special conditions, associated with native arsenic, bismuth, &c. in isolated patches, and I was quite unprepared to find it so intimately mixed up with the Tin Ore in that mine.

I have reason to believe, that Dolcoath Tin Ore does not form an exceptional case, and that if a careful examination of the ores be made from the neighbouring mines, Cobalt will be found intimately associated with the Tin.

The Cobalt occurs in combination with arsenic, and in all probability enters into the composition of the Mispickel, or Arsenical Pyrites, which is always found with the Tin of that district.

In the calcination of the ore, which forms an intermediate process in the dressing of Tin Ores, the Arsenide of Cobalt is oxidised and converted into an Arseniate, and this is so intimately blended with the tin, that the subsequent process of washing fails to extract it wholly. I have no doubt of its presence in the dressed tin in an oxidised form, as it can be extracted readily by treating the ore with dilute sulphuric acid, which fails to dissolve unoxidised Arsenical Cobalt compounds.

Shortly after my examination of Dolcoath ore, I was induced to search for Cobalt in some of the products obtained in the process of tin smelting, and I came to the conclusion, that if Cobalt occurs associated with tin ore in any appreciable quantity, it will be found in the substance known to smelters as "Hard Head", in a highly concentrated form.

I accordingly selected for examination a sample of "Hard Head," which was of course formed in the ordinary way of smelting, from ores obtained from different localities, and I found that Cobalt existed to the extent of 4·40 per cent.

I am not aware that any reliable analyses of Hard Head have ever been published, so I am at a loss to know whether the presence of Cobalt in this substance has been before noticed.

I append a tolerably accurate analysis of the sample:—

Iron	53·80
Arsenic	18·00
Tin	16·25
Cobalt	4·40
Tungsten	3·50
Sulphur	2·50

I gather from this, that Hard Head is essentially a Speise, similar in composition, except as regards the Tin and Tungsten, to those combinations of Arsenic with Iron, Cobalt, and Nickel, which are formed when ores containing the above metals are submitted to certain smelting operations.

The specific gravity of the "Hard Head" is greater than Metallic Tin, which accounts for its separation into a distinct layer immediately on the hearth of the Furnace. I do not think the Tin indicated by the analysis enters at all into its composition chemically, but is merely imprisoned mechanically in the alloy.

I am inclined to believe that the presence of Iron and Cobalt may be somewhat beneficial in the smelting of Tin Ores which contain much Arsenic, as they form fusible compounds with the Arsenic which otherwise would alloy with the Tin and deteriorate its quality. The sample of "Hard Head" before described contains no trace of Copper, although Copper was unquestionably present in the Tin Ore before treatment, so that this metal is not eliminated through the Hard Head, but passes entirely into the Tin.

I think the subject of Cobalt in Tin Ores is worthy the attention of those who are more particularly interested in the Smelting of Tin; and I see no reason why the Cobalt should not be extracted profitably from the Hard Head, and at the same time afford a ready means for the recovery of a large portion of the Tin it contains, and which is now lost.

XV.—*Note on a portion of the incrusted surface of a block of "Jews' Tin."*—*By* J. H. Collins, F.G.S., *Secretary of the Royal Cornwall Polytechnic Society.*

AT the last meeting of the Royal Institution of Cornwall, a block of "Jews' Tin" from Tremethack Moor, in Madron, just purchased for the Institution, was exhibited for the first time to the members. This block was partially covered with a hard and brittle brown coating, in some places as much as $\frac{1}{4}$ inch thick. Mr. W. Jory Henwood, F.R.S., the late President, before the expiration of his term of office, placed a portion of this coating in my hands for analysis.

The brown color was not evenly distributed—some parts being darker than others; and under the microscope several minute shining particles were visible—probably particles of Metallic Tin. The specific gravity of the substance was 5·64.

After a few preliminary trials I found I had just 48 grains at my disposal, which I had previously reduced to a fine powder. On drying this powder, at a temperature of 120° C, it was reduced to 45 grains.

The powder was boiled with distilled water for a time, and yielded a solution from which I obtained ·5 gr. of Tin and ·3 gr. of Chlorine=·8 gr. of $Sn\,Cl_2$.

The powder was then digested with Aqua Regia, when the solution so obtained yielded .5 gr. of peroxide of iron, .21 of tin, and .2 silica.

What remained after this treatment was dark brown, very heavy, and much like ordinary "black tin" of good quality, in appearance; when dried it weighed 43.2 grains.

This was reduced in a crucible by Cyanide of Potassium, and yielded 34.12 grains of Metallic Tin=to 43.5 gr. of Sn O_2.

The quantities thus obtained were calculated to per-centages with the following result :—

Moisture evolved at 120° C	6.25
Metallic Tin	.43
Chloride of Tin	1.66
Peroxide of Tin	90.62
Peroxide of Iron	1.04
Silica	.41
	100.41

The crust therefore appears to be composed chiefly of peroxide of tin, somewhat resembling that native variety of Cassiterite called "Wood-tin," but neither so hard nor so heavy. It has no doubt been formed by the slow oxidation of the outer surface of the block of Metallic tin. The slowness of the change is, perhaps, indicated by the dense condition of the incrustation.*

Dec. 27, 1871.

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* On a similar sample of the same specimen, Mr. James Napier, F.C.S., remarks (20th December, 1871) :—

"The incrustation which invests the mass of *Jew's-house tin* from Tremethack-moor is a pure peroxide of tin with a mere trace of iron;—in short—the metal has been reconverted into *tin-stone*. This is of exceeding interest, as it shows how pure the metal must have been. All analyses of ancient bronze, however, show that the earliest are of the best quality."

XVI.—*Notes on the Ornithology of Cornwall, for the years* 1871–2. —*By* E. Hearle Rodd.

THERE has been only one addition to our Avi-Fauna during the past year, that I am aware of; but it is one of an interesting nature to our county, as it adds to our list a species which has only occurred once before in Britain, viz:—The Yellow-shanked Sandpiper, Yarrell's Supplement, 637, *Totanus flavipes; Scolopax flavipes* (Yellow-shanks Snipe), Wilson Amer. Ornith. 3, 83, Jameson's Edition; *Totanus flavipes*, Rich. and Swain, Faun. Boc. Amer., 390. It is an American species, common enough on that continent, and minutely described by Wilson. Its occurrence in Mount's Bay was duly recorded in the "Zoologist" for the month of September, 1871. I give you an extract of the note made at the time; and I am very glad that its occurrence took place before the completion of Mr. Gould's work on "The Birds of Great Britain," and during the issue of the new edition of "Yarrell's British Birds" by Professor Alfred Newton, of Cambridge, as the circumstance of its occurrence in Cornwall will now probably be recorded in those valuable works of Natural History. A figure of this Sandpiper is given in Yarrell's Supplement to his British Birds; the bird being wholly unknown as a British bird at the time of the publication of his great work on this branch of Natural History. The specimen now under notice was obtained from the margin of a pool in a salt marsh near Marazion, and within a very few yards of the sea. It was a male bird, and apparently in adult plumage.

Length	$10\frac{3}{4}$.
Bill	$1\frac{1}{16}$.
Tarsus	$2\frac{1}{16}$.
Middle Toe	$1\frac{3}{8}$.

The bill entirely black, and much more slender than that of the Redshank, and shorter by at least $\frac{1}{4}$ of an inch. In point of size and bulk, this bird appears to be intermediate between the Red-

shank *(Totanus calidris)* and the Dusky or Spotted Redshank *(Totanus fuscus)*. The upper plumage, including the greater and lesser coverts, is hair-brown, with a few ash-grey and dark blotches, and otherwise studded, although not very distinctly, with white, somewhat resembling the spots on the Wood Sandpiper's upper plumage. The colour of the legs at the time it was killed was reported to me, by Mr. Edward Vingoe who shot it, as being pale yellow giving way soon after death to a yellowish-olive tone. Under parts pure white; neck and breast striated with hair-brown. The wing quills, both primary and secondary, quite plain, without white. In the Redshank the secondaries show a good deal of white. The axillary flank feathers in this specimen are *barred* and *not white*, as mentioned by Yarrell. The Redshank has these plumes pure white, and this extends over the body plumage above the upper tail coverts and under the scapulary feathers; but in the Yellow Shanks this body plumage is dark grey, the only white appearing at the roots of the tail, forming a bar $\frac{3}{4}$ of an inch deep. All the under parts, from the belly to the under tail coverts, pure unsullied white. In the Redshank this posterior under plumage behind the legs is streaked with pale brown. From the abrased edges of the wing feathers, the specimen appears to be adult. I observed that the legs were much less bulky than those of the Redshank. This species of Sandpiper is well known and common on the continent of America. From our Cornish shores being the first land from North America, Naturalists are now pretty well prepared for all sorts of occasional American stragglers, both in Land and Water Birds, turning up in Cornwall; and this should be regarded as a point of especial interest and encouragement to our county, and to those who are disposed to take up Natural History as a science.

Amongst other birds of comparative rarity and interest that have been noticed since your last Spring Meeting, I may mention the Avocet, with its curious recurved bill resembling a cobbler's awl, which was reported in the "Zoologist," by Mr. Gatcombe of Stonehouse, as having occurred on the St. Germans River. This prettily marked piebald bird has become comparatively rare throughout the kingdom since the drainage of the Fen lands has been perfected, by which the economy of their feeding-ground has been destroyed.

A specimen of the Kentish Plover, and several Redbreasted Mergansers, some in their adult ornamental plumage, which adds much to their beauty, have been obtained from the neighbourhood. These are met with generally every year in our estuaries, but mostly in their unadult plumage.

The Squacco Heron, one of the most beautiful and diminutive of the *Ardeidæ*, with the dorsal and occipital plumes in an advanced state of development, was captured near the Lizard.

The Scilly Isles have afforded specimens of the Marsh Harrier, Golden Orioles (which remained on until the end of May, when they, as usual, suddenly disappeared without nesting), the Spoonbill, and Redstarts,—the latter little warbler, although common in most parts of Britain, is scarcely ever seen in the West of Devon or in Cornwall.

We have had no rare specimens of Ducks this winter; and, in fact, the extreme mildness and openness of the season have afforded nothing in the Autumnal and Winter migratory movements more than the ordinary visits of Wild Ducks, Wigeon, and Teal.

EDWD. HEARLE RODD.

Penzance, March 14, 1872.

XVII.—*On Pustulopora clavata of Busk, from the Wolf Rock, near Penzance.*—*By* CHARLES W. PEACH, A.L.S.

Read at the Spring Meeting, May 23, 1871.

AT your Meeting on the 18th of May, 1869, I had the pleasure of exhibiting a branched specimen of *Polyzoa*, which I had noticed in a collection of Zoophytes, from the Wolf Rock, belonging to Miss E. Carne, of Penzance. As it much attracted my attention, Miss Carne kindly allowed me to take it, so that I might ascertain whether or not it was new. Having no books or specimens in Cornwall, I was then unable to say anything about it, beyond expressing my belief that it differed from all the recent ones I had seen. The nearest in resemblance to it was one dredged by Mr. J. Gwyn Jeffreys in Shetland; and when I was with him in 1864, I picked out a few specimens from the dredged material. The first specimen of it was got in West Greenland, by Dr. Sutherland, and was named by Professor Busk, *Tubulipora ventricosa*, this trivial epithet being assigned to it because of its peculiar inflated tip. The peculiarity made me doubt that it and the Cornish specimen were of the same species.—The next specimen that came under my notice was from the *Crag Formation*.

As soon as possible, after my return to Edinburgh, I referred to "The Monograph of the Polyzoa of the Crag," by Professor Busk; published by the Palæontographical Society in 1859; and, on my examining Plate XVII, fig. 1, and reading at p. 107 the description, I felt satisfied that Pustulopora clavata, figured and described there, was of the same species as the *recent* one from the Wolf Rock, and not *Tubulipora ventricosa*, of the Greenland and Shetland Seas; and thus, although not new to *Geology*, it was so to our *recent* Fauna. A very pretty addition it is, and for it we are under great obligations to Miss Carne. Anxious to be correct, I resolved not to publish any notice of it until I had seen Professor Busk. That pleasure was afforded me, when in London in

C. W Peach, del.t

Mc Farlane & Erskine, Lith.rs Edin.r

POLYZOA.

November, 1870, when he was kind enough to examine, with me, the specimens, and he came to the same conclusion as that which I had arrived at; and now, considering that your Institution has the prior claim, I have very great pleasure in sending you the first notice of the decision, for your forthcoming Meeting.

Pustulopora clavata may be thus described:—Polyzoarium ramose, branches cylindrical, with tubular cells springing from all sides of the stems, surface entire and not annulated, tips dilated and truncate, the open ends of the clustered tubes filling all the top, *but not rising above it*, as they do in *Pustulopora ventricosa*, as may be seen in the accompanying sketch, *fig.* C. and at D. where the tip is much more enlarged. It was attached to, and nestled amongst, other zoophytes; one piece was partly covered by the sponge, *Halichondria panicea*, all its companions being well-known British forms.

The other figures on the plate are intended for the notice of *Eschara verrucosa*, published in Vol. x, p. 116, of your Journal.

Fig. 1. Natural size.
2. Transverse section of lower end of stem, magnified.
3. Cells on older portion of stem, much enlarged.
4. A vibraculum do., do.
5. Young cells from the upper part of a branch do., do.

30, Haddington Place, Edinburgh,
10th May, 1871.

XVIII.—*A Calendar of Natural Periodic Phenomena: kept at Bodmin for the year* 1871.—*By* THOMAS Q. COUCH, F.S.A.

"Il semble, en effet, que les phénomènes périodiques forment, pour les êtres organisés, en dehors de la vie individuelle, une vie commune dont on ne peut saisir les phases qu'en l'étudiant simultanément sur toute la terre." —*Quetelet.*

N.B.—The names printed in *Italics* indicate plants and animals marked for special observation.

fl., means flowers; fol., foliates; defol., defoliates.

The time of flowering is to be noted when the flower is sufficiently expanded to show the anthers; of foliation, when the leaf-bud is so far open as to show the upper surface of the leaves; of fructification, at the period of dehiscence of the pericarp, in dehiscent fruits; and, in others, when they have evidently arrived at maturity; of defoliation, when the greater part of the leaves of the year have fallen off.

My observation of natural phenomena has suffered much unavoidable interruption, and is therefore not so full as in preceding years. I have, however, done my best not to lose a link in the chain of record. A longer series is needed, and of course some years must elapse before I can generalize. I wish I could get skilled observers, around our coast and inland, to assist me in a work which is of no mean importance. The natural philosopher would find additional interest in his daily walk, and even the *cui bono* man would find value in its results.

The year has been a very disastrous one in our district, as far as the human death and disease rate is concerned. Typhoid fever and Scarlatina have been prevalent and fatal, but, happily, are now almost gone. A few scattered cases of Small-pox have occurred

in the neighbourhood, but, by careful isolation, the disease has been prevented from spreading.

I am indebted to my friend Mr. Richard Tellum (an excellent botanist, whom I must get to send to our *Journal* his large contribution to what I have long wished to see— a *Cornish Flora*), for many of the following observations on the character of the year as to agriculture in this neighbourhood.

Wheat. The crop of 1871 proved very deficient in quantity and quality. The young plant suffered severely from the cold dry weather of the Winter and Spring; and, in many places, large pieces of a field were destroyed by that agricultural pest, the Wire-worm, which appears to have increased during the last two or three hot and dry summers. January came in excessively cold, doing great damage to early vegetation; the cold, dry ushering in of Spring made the wheat thin, and similar weather at the end of May and the beginning of June did not tend to improve it. On the 5th of June we had a sharp frosty morning (Thermometer 29°), followed by a good deal of stormy weather. July was generally wet, with a low temperature. There was a lack of good warm sun-beam for ripening, and consequently the grain was not well kerned, and there was a deficiency of good flour. Added to this, a great deal was secured in bad condition. The wheat crop was very far below the average.

Barley was very light in the Straw, and the grain imperfectly kerned; and a sample fit for malting purposes was hard to be obtained. The bushel proved under the average weight, and much below the usual yield in quantity.

Oats, on the whole, were a moderate crop, but not well saved.

The early *Hay* crop was light, and deficient in clover. The later crop was heavier; but a great part was damaged by the wet July weather.

In many places, the *Mangel Wurzel* crop failed, on account of the dry cold Spring; but where the surviving plants were thick enough, a good and heavy crop was taken up.

The *Turnips* generally turned out a good average crop, not having suffered much from the fly; and the late rains were much in their favour.

Potatoes suffered more from their inscrutable disease than for many years past. They were slow to come up, and the frosty June

mornings damaged them considerably. The disease, setting in early, injured the haulm before the tuber had attained much growth, and, consequently, it did not ripen properly.

The early and late frosts proved very destructive to the Fruit crop, injuring the bloom and the young shoots and leaves. The apple crop was a bad one, in quality as well as quantity.

The latter part of the year was mild, and the grass yielding a good crop, the young sheep did better than usual.

Certain migratory birds were very scarce, among which I may name woodcocks, cuckoos, and corn-crakes.

January 11. *Redbreast (Sylvia rubecola), sings.*
23. *Hazel (Corylus Avellana), fl.*
26. *Snowdrop (Galanthus nivalis), fl.*
28. *Gooseberry (Ribes grossularia), fol.*

February 1. *Partridges, (Perdix cinerea), pair.*
9. Barren Strawberry, (Potentilla fragariastrum), fl.
13. *Cardamine hirsuta, fl.*
— Procumbent Speedwell (Veronica agrestis), fl.
17. Pile wort, (Ranunculus ficaria), fl.
21. *Honeysuckle (Lonicera Periclymenum), fol.*
24. Primrose, (Primula vulgaris), fl.
27. *Elder, (Sambucus nigra), fl.*

March 3. Lent-lily, (Narcissus pseudo-Narcissus), fl.
5. *Ash, (Fraxinus excelsior), fl.*
12. *Lilac tree (Syringa vulgaris), fl.*
— *Whitethorn, (Cratægus Oxycantha), fol.*
16. Blackberry, (Rubus fruticosus), fol.
17. *Chaffinch, (Fringilla cœlebs), sings.*
— *Ground Ivy, (Glechoma hederacea), fl.*
18. Dog violet, (Viola canina), fl.
20. Wood sorrel (Oxalis Acetosella), fl.
23. *Swallows (Hirundo rustica), seen in numbers.*
26. *Sycamore, (Acer pseudo-platanus), fol.*
27. *Birch, (Betula alba), fol.*
— *Walnut (Juglans regia), fol.*

April 3. Greater Stitchwort, (Stellaria holostea), fl.
— *Laburnum, (Cytisus laburnum), fol.*

April 4. *Lime, (Tilia Europœa), fol.*
5. *Ash, (Fraxinus excelsior), fol.*
11. Early purple Orchis, (Orchis mascula), fl.
12. Ladies' smock, (Cardamine pratensis), fl.
— *Care tree, (Sorbus aucuparia), fl.*
14. *Ramsons, (Allium ursinum), fl.*
17. *Cuckoo, (Cuculus canorus), heard.*
18. *Lilac, (Syringa vulgaris), fl.*
19. Wild Hyacinth, (Hyacinthus non-scriptus), fl.
21. Martin, (hirundo urbica), seen.
— Beech, (Fagus sylvaticus), fol.
24. Horse-chesnut (Æsculus hippocastanum), fl.
— Bugle, (Ajuga reptans), fl.
26. *Corn-crake, (Crex pratensis), heard.*
— Fern-nut, (Bunium flexuosun), fl.

May 1. *Whitethorn, (Cratœgus oxycantha), fl.*
27. *Wild Guelder Rose, (Viburnum opulus), fl.*
— Bastard balm, (Melittis melissophyllum), fl.
— *Privet moth, (Sphinx ligustri), seen.*
28. Foxglove, (Digitalis purpureum), fl.
— *Honeysuckle, (Lonicera Periclymenum), fl.*
29. Cockchafer, seen.
30. Dog Rose, (Rosa canina), fl.

June 1. Blackberry, (Rubus fruticosus), fl.
— Lesser Stitchwort, (Stellaria graminea), fl.
— Tufted Vetch, (Vicia cracca), fl.
3. *Glow-worm, (Lampyris noctiluca), shines.*
— Wild strawberry, (Fragaria vesca), ripens fruit.
10. Horsefly, (Œstrus equus), appears.
14. *Privet, (Ligustrum vulgare), fl.*
18. *Lime, (Tilia Europœa), fl.*
19. Self-heal, (Prunella vulgaris), fl.
21. Great Mullein, (Verbascum thapsus), fl.
— Field Scabious, (Scabiosa arvensis), fl.
23. *Betony, (Betonica officinalis), fl.*
25. Tutsan, (Hypericum Androsæmum), fl.

July 1. Wood-sage, (Teucrium Scorodonia), fl.
8. Golden rod, (Solidago virgaurea), fl.
— Erythræa centaureum, fl.

July 9. Fine-leaved heath, (Erica cinerea), fl.
— *Wild Thyme*, (*Thymus serpyllum*), *fl.*
24. *Care tree*, (*Sorbus aucuparia*), *ripens fruit.*
August 13. Blackberry, (Rubus fruticosus), ripens fruit.
14. *Swifts*, (*Cypselus apus*), *last seen.*
20. *Elder*, (*Sambucus nigra*), *ripens fruit.*
September 7. *Magpies*, (*Pica caudata*), *congregate.*
— *Sycamore*, (*Acer pseudo-platanus*), *defol.*
16. *Honeysuckle*, (*Lonicera periclymenum*), *ripens fruit.*
October, 1st week. *Birch*, *defol.*
11. *Starlings*, (*Sturnus vulgaris*), *appear in flocks.*
23. *Swallows congregate on roofs. Evidently attachment to house and nest is broken up.*
November, 1st week. *Beech*, *defol.*
— *Larch*, (*Larix communis*), *defol.*
2. *Woodcock*, (*Scolopax rusticola*), *seen.*
5. *Laurustinus*, *fl.*
December 31. Man. Scarlatina of a fatal type still existing, and a few scattered cases of enteric fever.

METEOROLOGICAL NOTES FOR 1871.

The detailed statement of the results obtained at Bodmin, Truro, Falmouth, Helston, and Scilly, prepared by Mr. Dymond, and published, with his able and very interesting comparative remarks thereon, in the Report of the Cornwall Polytechnic Society just issued, renders it unnecessary to notice as fully as in former years the observations recorded at some of those stations. It will be sufficient to give a summary view of the several months, embracing a glance at the climatic history of the country generally, together with some particulars derived from parts of Cornwall not included in the publication referred to.

January began, as December had ended, with severe cold. The lowest temperature of the whole year (18°) at Truro, occurred on the 1st. At Altarnun it was 14° on the same day. The weather became gradually milder, and continued so till the 18th, when a cold period set in, and lasted to the end of the month, but without intense frost. At Altarnun, Mr. C. U. Tripp states, that "the grass thermometer fell below 32° on 28 days. The roads in this vicinity in a fearfully slippery state on the first 8 days. Two cases of fractured limbs in adults here when walking." The temperature of the month at Bodmin was 5·3° below the average. There was a heavy gale, with fall of temperature, on 16th. The velocity at Falmouth was 60 miles per hour. The rainfall, which was decidedly above the average at Penzance and Helston, was in about the same proportion below it at Truro and Bodmin, and this difference was more strongly marked at Altarnun.

February calls for little remark. It was a mild month; the average temperature at Bodmin was 2·3° in excess. The rainfall was below the average. at and west of Truro, and also at Altarnun; but rather in excess at Bodmin, Robin's nest building near Truro on 18th. There was a fine Aurora Borealis on the 12th, which was generally observed through the evening. Mr. Tripp thus describes it at Altarnun at midnight: "The E. and S. sky was covered "with rays of green and yellow light which were constantly changing their "position and colour. At 10.30 next morning the Aurora still seemed visible "as a broad stream of white light shooting up from the N. horizon, and ex-"tending itself like a fan on both sides. It then gradually faded."

March was generally mild and spring-like. Easterly winds prevailed after the 22nd. The average temperature at Bodmin, was 3° in excess. The close of the month was bleak through the county; severely so at Altarnun, where the thermometer fell to 18° on 29th. The rainfall, only about half the average at all the stations, occurred wholly from 5th to 15th.

Looking at the quarter generally, through the country, as estimated by Mr. Glaisher, the frost and snow in January stopped all outdoor farm work; pastures were bare, and the scarcity of fodder was severely felt. Towards the

end of February, under the influence of the higher temperature, shrubs and early fruit trees began to bud; but all kinds of vegetables were scarce. During March agricultural operations progressed vigorously; the land was found to be unusually free from insects, and at the end of the quarter a very large breadth of land was under cultivation; but vegetation was still backward, and forage very scarce.

April was generally mild and damp. The temperature was rather above the average, although the number of rainy days was more than 1-4th greater than usual, and the rainfall just twice so. On 5th there was a remarkable solar halo, discussed by Dr. Jago in this No. of Journal.

May was a very fine month, with only half an inch of rain (1-5th the average), which fell on 5 days, instead of about 14, the standard; but the air was mostly harsh and parching. The wind was in the E. quarter on 17 days. The mean temperature at Bodmin was 2·6° in excess; but this was owing to the heat of many bright days; the nights being often cold and even frosty. Thus the maximum reached 80° both at Truro and Altarnun, the minimum falling to 32° and 29° respectively.

June was also generally ungenial, although the Bodmin mean temperature was 2·2° in excess. The beginning of the month was chilly, and also much of its close. This was everywhere the character especially of Midsummer day, which was almost wintry. The air was dry; and the rainfall at Truro and west of it, was only one-half the average, although the number of days more or less wet, was distinctly above it. At Bodmin about the ordinary quantity of rain fell; and at Altarnun it was one-third in excess. Mr. Tripp gives a description of the spring months in that district, which will apply, with some deductions, to the county generally: "From the 10th to 22nd of April was a period of heavy and welcome rains, which saved the hay crop in this neighbourhood. But the spring months, with this exception, were mostly as bitter and unpleasant as ever remembered, and the cold and E. wind characteristic of March continued into June, a most disastrous season for all garden crops." In regard to Greenwich, Mr. Glaisher says—"The deficiency of temperature for the whole quarter amounted to more than 1¼° daily, from the average of 50 years, and there has been no corresponding quarter of as low a temperature here since 1860."

Excepting its third week, *July* was a cold month, and it was very wet, the rainfall being twice the average at all the stations, and the number of wet days a full third above it.

August was the only really summer month. Its mean temperature at Bodmin was 4·2° in excess. The greatest heat at each of the stations was, at Altarnun, 87°; Bodmin, 79°; Truro, 85°; Falmouth, 79°; Helston, 86°; Penzance, 75½°; Scilly, 74°. The quantity of rain was little more than one-half the standard, and the number of days on which it fell was about one quarter less. There were heavy showers locally in connection with thunderstorms, which were rather frequent. That on the night of the 14th was general, and particularly magnificent. Capt. Liddell mentions that about 10 p.m. 0·60 inch of rain fell in 10 minutes, at Bodmin.

September was generally dull and showery, with S.W. winds, till after the 11th, when there was a shift to N. and E., and fine—rather cold, weather, till the 23rd. There was a heavy gale on 10th, and about an inch and three quarters of rain fell, more than the total for the same month in 1870. The next fortnight of fine and genial weather was of great advantage to late harvest work. It was succeeded by heavy and almost constant floods till the end of the month, the rainfall of which (8·50 inches) exceeded the average, in the proportion of 8 to 3,—one-half of this having been gauged in the last week. The mean temperature of the month at Bodmin was nearly 2 degrees below the average. Mr. Glaisher reports, from the Greenwich observations, that during the period of 42 days of warm and genial weather, extending from August 6th to Sept. 16th, the mean excess of temperature above the average was 4½° daily.

October began and ended with heavy gales and rain, and was altogether rather wet, the rainfall (5·19 inches), and the number of days on which it fell, being each about 1-5th above the average. The Bodmin temperature was just the mean of 22 years. There was no frost at any station except Altarnun, where it was noted on four nights, the thermometer falling to 30° on 9th.

November was a rather cold month, even in the west; but more decidedly so at the eastern stations. The mean temperature at Bodmin was 3·1° below the average. The minimum was 22° there and at Truro, and 20° at Altarnun, where there were 18 frosts. The cold was more severe and prolonged up the country; it set in on the 2nd, and continued through the whole month, and on to Dec. 12th. In the last 85 years there has not been at Greenwich any instance of such a cold November.

The differences in the rainfall at the several stations deserve remark. At Altarnun and Bodmin, it was much less than half the average for the month; at Newquay, St. Agnes, and Truro, a little under the same proportion; whilst at Falmouth and Helston it just reached the usual standard. The difference between Falmouth and Truro is accounted for by a torrent measuring 2·23 inches at the former place on the 7th, when the fall at the latter was only ·46 inch, a curious fact in relation to places so near each other. Capt. Liddell remarks that the rainfall at Bodmin was the smallest ever known there in November. There was a very fine Aurora on the 10th.

The first half of *December* was cold. The Bodmin mean temperature was 2·1° below the average. The minimum there was 18°; at Altarnun, 16°; at Truro, 21°; whilst at Falmouth, it was 29·1°, and at Helston, 26°. The 5th was everywhere the coldest day. At Scilly, the lowest temperature was 33°, not quite freezing. The grass thermometer at Altarnun fell to 9° on 5th and 8th. The rest of the month was mild, wet, and stormy; bringing the rainfall nearly up to the average. There was a short but very violent tempest on the 20th, from W.S.W. to W.N.W.; the maximum velocity registered at Falmouth was 67 miles per hour. Trees were uprooted at Altarnun, our easternmost station; whilst at Scilly, the most western, the unfortunate steamer, Delaware, was lost, with nearly all hands.

Altogether Cornwall escaped much of the intensity of cold experienced up the country. At Greenwich, for instance, the mean temperature of the 7th, 8th, and 9th of December, was more than 14° below the average for those days; and in other parts, in Norfolk especially, it was much colder still.

The following Table will exhibit, in a still clearer light, some of the most important characteristics of the Summer Months of last year, severally and collectively, in their comparative relations to the averages of a long series of years, in the Truro district.

1871.	Obscuration of Sun at 9 a.m. and 3 p.m.						Actual Weather at 9 a.m., 3 p.m. & 9 p.m.				Rainfall.				Wet Bulb Thermometer		Humidity of Atmosphere.	
	Sunshine.		Gleam.		Cloud.		Dry.		Wet.		Quantity in inches.		No. of days with rain		Below Dry.		Saturation 100.	
	20 yrs.	1871	20 yrs.	1871	20 yrs.	1871	19 yrs.	1871	19 yrs.	1871	22 yrs.	1871	22 yrs.	1871	22 yrs.	1871	22 yrs.	1871
April .	32·3	31	6·5	6	21·2	23	76·5	71	13·5	19	2·68	4·14	13·2	17	2·95	2·50	79·0	86
May ..	35·3	52	7·0	2	19·7	8	81·9	91	11·1	2	2·62	·55	13·5	5	3·82	4·50	76·3	74
June..	35·3	41	7·9	2	16·8	17	80·3	86	9·7	4	2·23	1·19	12·5	16	3·31	3·60	77·8	81
July ..	35·8	34	7·7	4	18·5	24	84·1	80	8·9	13	2·42	5·24	12·7	20	3·55	3·00	79·4	82
Aug...	37·7	49	7·1	1	17·2	12	83·0	85	10·0	8	2·52	1·85	13·3	11	3·55	4·00	80·0	77
Sept ..	29·8	36	7·0	4	23·2	20	74·4	77	15·6	13	3·39	8·50	15·7	18	3·22	3·20	80·2	81
Means.	34·4	40·5	7·1	3·1	19·4	17·3	80·0	81·7	11.5	9·8	2·63	3·58	13·5	14·5	3·60	3·67	78·8	20·8

C. BARHAM.

Summary of Meteorological Observations at Truro, in Lat. 50° 17′ N., Long. 5° 4′ W., for the year 1871, from Registers kept at the Royal Institution of Cornwall.

1871.	MONTHLY MEANS OF THE BAROMETER. Cistern 43 feet above mean sea level.																	
Month.	Mean pressure corrected to 32 deg. Fahr. at sea level.			Mean of monthly means.	Mean correction for diurnal range.	True mean of monthly means.	Mean force of vapour.	Mean pressure of dry air.	Corrected absolute maximum observed.	Day.	Corrected absolute minimum observed.	Day.	Extreme range for the month.	Mean diurnal range.	Greatest range from 9 a.m. to 9 p.m.	Day.	Greatest range in any 24 consecutive hours.	Between which days it occurred
	9 a.m.	3 p.m.	9 p.m.															
	in.	in.	in.	in.	in.	in.	in.	in.	in.		in.		in.	in.	in.		in.	
January .	29·851	29·828	29·849	29·843	·004	29·839	·198	29·641	30·326	12	28·876	16	1·450	·130	·59	10	·64	9 & 10
February.	30·059	30·047	30·067	30·058	·003	30·055	·277	29·778	30·514	21 22	29·474	10	1·040	·092	·38	21	·74	9 & 10
March ..	30·071	30·056	30·029	30·052	·007	30·045	·261	29·784	30·508	29	29·408	6	1·100	·093	·50	16	·51	11 & 12
April	29·863	29·856	29·868	29·862	·004	29·858	·303	29·555	30·213	4	29·200	19	1·013	·084	·24	14	·48	13 & 14
May	30·129	30·121	30·124	30·125	·003	30·122	·305	29·817	30·385	20	29·834	24	·551	·040	·14	22	·30	21 & 22
June	29·998	29·993	29·996	29·996	·001	29·995	·365	29·630	30·360	26	29·569	18	·791	·055	·14	29	·27	23 & 24
July	29·918	29·917	29·940	29·925	·002	29·923	·428	29·495	30·244	6	29·521	2	·723	·080	·23	24	·36	1 & 2
August ..	30·056	30·067	30·080	30·068	·004	30·064	·467	29·597	30·556	27	29·183	18	1·373	·080	·57	18	·70	17 & 18
Sept.	29·891	29·876	29·878	29·882	·004	29·878	·386	29·492	30·234	14	28·888	27	1·346	·079	·24	23	·74	27 & 28
Oct	29·947	29·942	29·964	29·951	·006	29·945	·343	29·602	30·443	25	29·325	1	1·118	·093	·26	3	·44	21 & 22
Nov.	30·001	29·987	30·009	29·999	·004	29·995	·225	29·770	30·368	19	29·568	7	·800	·068	·21	11	·38	13 & 14
Dec. ...	30·156	30·134	30·164	30·151	·003	30·148	·212	29·936	30·568	12 13	29·217	28	1·351	·092	·42	21	·43	21 & 22
Means ..	29·995	29·985	29·997	29·993	·004	29·989	·314	29·675	30·393		29·339							

REMARKS.—The Barometer used is a Standard, made by Barrow, and compared with the Standard Barometer at the Royal Observatory, Greenwich, by Mr. Glaisher. The corrections for Index Error (+·008), Capillarity (+·013), height above sea (43 feet), and temperature, have been applied.

TABLE No. 2.

MONTHLY MEANS OF THE THERMOMETER.

1871. Month.	9 A.M. Dry Bulb.	9 A.M. Wet Bulb.	3 P.M. Dry Bulb.	3 P.M. Wet Bulb.	9 P.M. Dry Bulb.	9 P.M. Wet Bulb.	MASON'S HYGROMETER. Mean of Dry Bulb.	Mean correction for diurnal range	True mean of Dry Bulb.	Mean of Wet Bulb.	Mean correction for diurnal range.	Mean temp. of evaporation.	Wet Therm. below dry.	Mean dew point.	Dew point below Dry Therm.	SELF REGISTERING. Mean of all the maxima.	Mean of all the minima.	Approximate mean temp.	Correction for the month.	Adopted mean temp.	Mean daily range.	ABSOLUTE. Maximum.	Day.	Minimum.	Day.	Range.
	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°		°		°
January..	38·0	36·2	42·3	39·0	38·8	37·1	39·7	0·5	39·2	37·4	0·3	37·1	2·1	34·3	4·9	44·0	34·5	39·2	0·1	39·1	9·5	51	6	18	1	33
February	46·1	44·4	50·0	46·9	47·0	45·6	47·7	0·5	47·2	45·6	0·4	45·2	2·0	43·0	4·2	51·5	43·4	47·4	0·3	47·1	8·1	57	18	31	22	26
March ..	47·7	44·9	52·4	47·4	45·4	43·4	48·5	1·0	47·5	45·2	0·6	44·6	2·9	41·4	6·1	54·0	40·9	47·4	0·4	47·0	13·1	65	27	30	17	35
April....	51·4	48·5	55·0	50·3	48·9	47·4	51·7	1·3	50·4	48·7	0·8	47·9	2·5	45·3	5·1	56·0	46·0	51·0	1·0	50·0	10·0	60	thr	29	5	31
May	57·5	51·5	61·4	53·5	51·7	48·9	56·8	2·4	54·4	51·3	1·4	49·9	4·5	45·5	8·9	64·0	44·5	54·2	0·6	53·6	19·5	80	29	32	12	48
June	59·2	54·7	62·9	57·0	55·7	53·3	59·3	2·1	57·2	55·0	1·4	53·6	3·6	50·3	6·9	65·0	50·7	57·8	1·1	56·7	14·3	75	1	35	5	40
July	62·2	58·0	64·7	60·0	58·5	56·4	61·7	1·4	60·3	58·1	0·8	57·3	3·0	54·7	5·6	67·0	55·8	61·4	1·4	60·0	11·2	78	17	45	10	33
August ..	66·5	62·0	71·0	64·0	61·7	59·5	66·4	2·0	64·4	61·8	1·4	60·4	4·0	57·1	7·3	73·6	56·4	65·0	1·0	64·0	17·2	85	9	46	28	39
Sept.....	59·8	56·3	63·0	57·7	55·0	53·0	59·3	1·4	57·9	55·7	1·0	54·7	3·2	51·9	8·0	65·6	51·1	58·3	0·8	57·5	14·5	75	2	39	25	36
Oct.	53·8	51·5	57·8	53·6	52·3	50·1	54·6	0·9	53·7	51·7	0·6	51·1	2·6	48·6	5·1	59·0	48·0	53·5	0·3	53·2	11·0	63	15 17	36	thr	27
Nov.....	43·1	40·4	48·4	43·8	42·7	40·5	44·7	0·6	44·1	41·6	0·5	41·1	3·0	37·6	6·5	50·0	39·3	44·6	0·5	44·1	10·7	57	1	22	18	35
Dec.	39·0	37·3	47·0	43·0	39·7	38·0	42·0	0·4	41·6	39·4	0·3	39·1	2·5	36·0	5·6	48·4	34·7	41·6	0·0	41·6	13·7	53	19 30	21	5&9	32
Means ..	52·0	48·8	56·3	50·5	49·8	47·8	52·7	1·2	51·5	49·3	0·8	48·5	3·0	45·5	6·2	58·2	45·5	51·8	0·6	51·2	12·7	67		32		35

The Thermometers are placed on the roof of the Royal Institution in a wooden shed, through which the air passes freely. The Standard Wet and Dry Bulbs are by Negretti and Zambra, and have been corrected by Mr. Glaisher.

1871.	WINDS.																											
Month.	E.			S.E.			S.			S.W.			W.			N.W.			N.			N.E.			AVERAGE FORCE.			
	9 a.m.	3 p.m.	9 p.m.	9 a.m.	3 p.m.	9 p.m.	9 a.m.	3 p.m.	9 p.m.	9 a.m.	3 p.m.	9 p.m.	9 a.m.	3 p.m.	9 p.m.	9 a.m.	3 p.m.	9 p.m.	9 a.m.	3 p.m.	9 p.m.	9 a.m.	3 p.m.	9 p.m.	9 a.m.	3 p.m.	9 p.m.	Mean.
January..	4	4	4	1	3	2	3	3	2	6	2	3	1	6	3	7	3	8	6	7	7	3	3	2	1·8	2·7	2·2	2·2
February.	1	2	1	3	4	1	5	3	5	3	6	6	10	5	7	3	5	7	2	1	2	1	0	0	2·2	3·0	2·2	2·5
March ..	7	7	8	2	0	0	4	6	4	2	3	5	5	3	2	2	5	5	5	4	5	4	3	2	2·7	3·2	2·2	2·7
April	6	3	3	3	3	0	1	3	4	1	3	7	12	8	6	4	7	6	3	2	2	0	1	2	2·9	3·4	2·0	2·8
May	6	9	8	3	4	2	1	5	3	0	0	0	1	1	1	5	6	6	7	6	9	8	0	2	2·0	2·5	1·0	1·8
June	2	2	2	1	1	1	7	3	3	2	1	3	3	6	3	5	5	7	9	12	9	1	0	2	2·5	3·0	1·7	2·4
July .. .	0	2	1	2	0	0	3	1	3	7	7	8	9	13	12	8	5	4	2	3	3	0	0	0	2·5	2·8	1·5	2·3
August ..	10	6	3	1	3	3	6	4	5	2	2	2	3	3	3	5	6	7	3	7	7	1	0	1	1·8	2·3	1·4	1·8
Sept.....	5	9	8	2	2	0	2	1	1	2	2	3	1	2	2	5	6	6	3	4	6	11	3	4	2·1	2·4	2·0	2·0
Oct.	0	1	2	5	4	4	6	8	5	7	2	5	4	6	3	3	3	5	4	6	6	2	1	1	2·0	2·9	2·0	2·3
Nov.....	4	4	3	2	4	3	3	2	2	0	2	1	0	0	0	5	4	6	8	6	6	8	8	9	2·0	2·6	2·0	2·2
Dec.	1	1	0	0	0	0	2	3	0	8	9	9	3	4	4	4	5	6	7	5	7	6	4	5	1·6	2·2	1·6	1·8
Total....	46	50	43	25	28	16	43	42	37	42	39	52	52	57	46	56	60	73	59	63	69	45	23	30	26·1	33·0	21·8	26·8
Means ..	46·3			23·0			40·7			44·3			51·7			63·0			63·7			32·7			2·2	2·7	1·8	2·2

The force of the Wind is estimated on a scale from 0 to 6, from *calm* to violent *storm*.

1871. Month.	WEATHER. AVERAGE CLOUDINESS. 9 a.m.	3 p.m.	9 p.m.	Mean.	RAINFALL. Amount in inches. Truro.	Penarth.	No. of days in which rain fell.	Greatest Fall in 24 hours. Truro. Depth.	Date.	Mean weight of vapour in a cubic foot of air.	Mean additional weight required for saturation of the air.	Mean humidity of atmosphere.	Mean elastic force of vapour.	Mean weight in grains troy of a cubic foot of air.	Amount of water in a vertical column of air.	SUN. Shine.	Gleam.	Cloud.	Dry.	Wet.	REMARKS.
					in.	in.				grs.	grs.		in.	grs.	in.						
January .	7·6	7·2	7·2	7·3	4·29	4·41	20	·80	15	2·3	0·5	84	·198	538·9	2·7	20	2	40	74	19	Frost, 1, 3, 13, 18, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30. Hail, 2, 7, 8, 9. Snow, 25, 26, 27. Gale, 9, 10, 14, 15, 16.
February	7·5	8·0	8·0	7·8	2·19	2·17	18	·53	9	3·2	0·5	86	·277	548·2	3·8	19	5	32	61	23	Frost, 11, 22. Gale, 10. Fog, 15.
March ..	6·4	5·8	4·3	5·5	1·57	1·33	10	·42	9	2·9	0·8	79	·261	548·3	3·6	38	7	17	87	6	Gale, 5, 6, 7, 9, 10, 12, 15, 16. Hail, 13. Frost, 17.
April	7·4	7·0	7·4	7·3	4·14	4·65	17	·63	20	3·5	0·6	86	·303	526·7	4·1	31	6	23	71	19	Frost, 5, 6. Gale, 7, 16, 20. Solar Halo with Mock Suns. Aurora Borealis, 8. Swallow seen, 10. Cuckoo heard, 13.
May	4·9	4·3	3·5	4·2	0·55	·47	5	·22	25	3·5	1·2	74	·305	540·5	4·2	52	2	8	91	2	Frost, 12.
June	6·7	6·6	5·9	6·4	1·19	1·29	16	·19	26	4·2	1·0	81	·365	519·0	5·0	41	2	17	86	4	
July	7·0	7·0	7·0	7·0	5·24	5·03	20	·80	3	4·7	1·1	82	·428	515·7	5·5	34	4	24	80	13	Thunder Storm, 29, 30. Remarkable Rain, 3.
August ..	5·0	4·8	4·5	4·8	1·85	1·48	11	·90	17	5·1	1·5	77	·467	529·5	6·4	49	1	12	85	8	Remarkable Rain, 17. Thunder Storm, 13, 14, 17.
Sept.	6·6	6·9	5·5	6·3	8·50	8·66	18	1·67	29	4·4	1·0	81	·386	518·0	5·3	36	4	20	77	13	Remarkable Rain, 9, 10, 25, 26, 29. Gale, 10, 11.
Oct. ...	7·7	7·0	6·3	7·0	5·19	5·48	23	1·46	28	3·8	0·9	80	·343	522·3	4·7	30	2	30	78	15	Remarkable Rain, 9, 10, 25, 26, 29. Gale, 10, 11.
Nov.	6·8	6·5	6·2	6·5	2·28	2·52	10	·45	2	2·6	0·7	77	·225	533·4	3·1	32	1	27	78	12	Frost, 11, 12, 13, 18, 29, 30. Gale, 25, 26.
Dec.	6·6	6·3	5·7	6·2	3·44	3·47	15	·76	19	2·4	0·7	78	·212	535·6	2·9	27	6	29	76	17	Frost, 2, 3, 4, 5, 6, 8, 9, 11, 13, 17, 23. Snow, 5. Hail, 6, 27. Fog, 12, 13, 14, 15, 17, 19.
Means ..	6·7	6·4	6·3	6·4	40·43	40·96	183			3·7	0·9	80	·314	531·0	4·3	34·0	3·3	23·0	78·7	11·3	

Cloudiness is estimated by dividing the sky into ten parts, and noting how many of these are obscured. The rain gauge at Truro is placed on the roof of the Royal Institution, at about 40 feet from the ground. Gleam is recorded when the sun's disk is visible through a film of cloud. The rain gauge at Penarth, near Truro, is 100 feet above the mean level of the sea.

Rain-fall in Cornwall in 1871, *with the yearly and monthly averages for some Stations.*

STATIONS FROM WEST TO EAST.	Jan. in.	Feb. in.	March in.	April in.	May in.	June in.	July in.	August in.	Sept. in.	Oct. in.	Nov. in.	Dec. in.	Total 1871. in.	Average yearly total.
(*a*) Scilly Islands, Mr. W. Thomas..1871	3·03	2·03	·91	3·23	·29	2·13	4·67	1·24	6·06	4·70	3·57	2·69	34·55	
(*b*) Penzance, Mr. W. H. Richards..1871	5·96	2·24	1·53	4·47	·37	1·20	5·34	1·94	7·96	6·36	3·15	4·19	44·71	
Average of last thirteen years	5·18	3·33	3·18	2·21	2·11	1·85	2·47	2·82	3·74	4·58	4·27	5·06		40·81
(*c*) Helston, Mr. M. P. Moyle.....1871	4·95	1·62	1·14	4·87	·90	1·25	5·25	1·35	8·27	5·38	3·41	3·16	41·55	
Average of last twenty-two years	4·13	2·54	2·99	2·47	2·32	2·12	2·50	2·63	3·10	4·34	3·51	3·70		36·50
Days with rain.....1871	22	14	9	19	4	14	17	9	16	20	17	14	175	
Average of last twenty-two years	20·2	15·3	15·7	11·8	11·7	12·1	12·8	12·6	13 7	18·1	17·0	19·0		180·9
(*d*) Truro, Royal Institution of Corn. 1871	4·29	2·19	1·57	4·14	·55	1·19	5·24	1·85	8·50	5·19	2·28	3·44	40·43	
Average of last twenty-two years	5·12	2·80	3·03	2·68	2·62	2·23	2·42	2·52	3·39	4·85	4·13	4·59		40·54
Days with rain..... 1871	20	18	10	17	5	16	20	11	18	23	10	15	183	
Average of last twenty-two years	20·7	15·8	16·7	13·2	13·5	12·5	12·7	13·3	15·7	19·8	18·3	19·8		190·6
(*e*) St. Agnes, Mr. J. Opie 1871	3·72	2·41	1·53	4·70	·49	1·12	5·31	3·37	7·23	6·56	1·72	4·14	42·30	
Days with rain.....1871	19	17	8	14	2	14	17	9	14	21	10	15	160	
(*f*) Newquay, Mr. Tregidgo 1871	4·22	2·28	1·66	4·00	·55	1·11	4·95	2·58	8·18	5·95	1·53	4·01	41·01	
Days with rain.....1871	13	12	8	14	5	14	19	8	14	21	9	16	153	
(*g*) Bodmin, Com. J. Liddell, R.N. 1871	5·06	3·69	1·91	5·82	·49	2·81	5·79	2·66	8·52	7·68	1·87	4·70	51·00	
Average of last twenty-two years	5·74	3·03	3·42	2·82	2·87	2·92	3·04	3·32	3·81	5·43	4·41	4·90		45·71
Days with rain.....1871	22	22	13	20	5	14	23	13	16	22	12	24	206	
Average of last twenty-two years	21·9	18·3	17·2	14·0	13·7	14·6	15·2	15·9	16·9	20·2	20·7	22·7		211·3
(*h*) Altarnun Vicarage, Mr. C. U.Tripp,1871	5·64	4·13	2·99	6·42	·71	3·17	7·05	2·64	7·84	8·56	1·94	5·13	56·22	
Average of last eight years	8·08	5·81	4·26	3·06	3·30	1·98	3·37	4·07	5·77	7·45	5·25	6·72		58·83
Days with rain.....1871	23	20	12	18	4	14	24	16	16	23	10	19	199	
Average of last eight years	20·4	20·9	18·1	14·6	13·6	11·6	14·6	14·1	18·1	21·6	17·7	19·9		207·1

(*a*) Rain Gauge about 60 feet above mean sea level.
(*b*) „ 3 feet above ground, 86 feet above mean sea level.
(*c*) „ 5 „ „ 115 ft. „ „
(*d*) „ 40 „ „ 56 ft. „ „
(*e*) Rain Gauge 1 foot 4 inches above ground, 300 feet above mean sea level.
(*f*) „ 1 „ 9 „ „ 90 „ „
(*g*) „ 2 „ 6 „ „ 330 „ „
(*h*) „ 0 „ 7 „ „ 570 „ „

CHRONOLOGICAL MEMORANDA.

1871.

January 3. The *Western Morning News* publishes a "Meteorological Summary for the year 1870."

January 4. The *Cornish Telegraph* publishes an "Abstract of the Weather at Penzance and neighbourhood, for the year 1870"; by W. Hosken Richards.

January 12. Conversazione of the Plymouth Institution at the Plymouth Athenæum.

January 14 and *February* 4. The *Cornwall Gazette* publishes articles entitled "Cornwall Two and a Half Centuries ago."

January 14. Mr. John Maclean, F.S.A., receives from Her Majesty the Queen, at Osborne, the honour of Knighthood, in recognition of his merits, on his retirement from the public service, on pension, upon the abolition of the office of Deputy Chief Auditor of Army Accounts.

January 18. *Cornish Telegraph* publishes a notice of the Roman Coins found, in 1825, near the estuary of Hayle.

January 18. *Cornish Telegraph* publishes a letter signed "W. N.," on the antiquity, in Keltic, of the story of "Tom of Chyannar, the Tin Streamer," a version of which, by "Old Celt," had recently been published in successive numbers of the *C. T.*

January 25 and *February* 1. *Cornish Telegraph* publishes "Glimpses of the two Cornwalls;" a lecture on ancient and modern Cornwall, by Mr. J. M. Doble.

January—July. The *Journal of the Anthropological Institute*, No. i., contains a paper by "A. L. Lewis," entitled "A description of some Archaic Structures in Cornwall and Devon."

February 1. *Cornish Telegraph* contains an article on "The Hoar Rock in the Wood."

February 1. *Western Morning News* publishes a description, by Mr. J. Piers St. Aubyn, of Tintagel Church.

February 1, 8, 22; *March* 8, 15, 22; *April* 5; *May* 24, 31. *Cornish Telegraph* publishes "Scraps of County History."

February 2. *West Briton* records that, recently, an American Bittern, *(Botaurus lentiginosus)*, and a Red Grouse, *(Lagopus Scoticus)*, had been shot near Liskeard.

February 4. *Cornwall Gazette* publishes a letter from "Christopher Cooke," on "Ictis Isle."

February 8. *Cornish Telegraph* publishes the tale, "Tom of Chyannar, the Tin-Streamer," in Ancient Cornish, with a translation.

February 9. *West Briton* publishes, under the heading "Cornubiana," a communication signed "Tre," concerning Mulfra Hill, near Penzance, and its antiquities.

February 9. Annual Meeting of the Royal Cornwall Polytechnic Society. Mr. Charles Fox elected president, for a term of three years; Mr. J. St. Aubyn, M.P., Rev. T. Phillpotts, Mr. Pendarves Vivian, M.P., Mr. W. P. Dymond, F.M.S., and Mr. G. Fox, elected Vice-Presidents.

February 11. The *Athenæum* records that at a meeting of the Archæological Institute, Sir Edward Smirke in the chair, Rev. W. Iago exhibited an Ivory Casket, belonging to the Bodmin Corporation, said to have been made to contain the bones of St. Petroc when they were brought back to England from Brittany in the 12th Century. Mr. Iago also exhibited a "skippet" found in the parvise of Bodmin Church, and a leather-covered case, probably of the 16th century, from Lanivet.—At the same meeting, Mr. W. H. Tregellas exhibited a collection of Roman Coins lately found in a vessel of coarse earthenware, at Allington Manor, near Southampton.

February 13. *Western Morning News* publishes a notice of a lecture, by Mr. Spence Bate, F.R.S., to the Exeter Naturalists' Club, on "The Præhistoric Antiquities of Dartmoor."

February 13. A very brilliant meteor visible throughout the West of England, shortly after nine o'clock, p.m. It appeared near the star Bellatrix and proceeded in a northernly direction. Its flight was attended by coruscations, and its trail was visible during several seconds after the body had disappeared.

February 18. *Cornwall Gazette* records that a Hooded Crow had recently been shot near Liskeard.

February 22. *Cornish Telegraph* states that the Ivory Casket from Bodmin excited so much interest that the Department of Science and Art sent to the Society of Antiquaries three smaller caskets, also in ivory, "resembling in general arrangement the very interesting specimen from Cornwall." Mr. J. C. Robinson considers the box Sicilian work of the 11th or 12th Century.

February 22. *Cornish Telegraph* contains the following:—A New Eel, believed to be an addition to the *Fauna* of Great Britain, has been obtained from fresh water in the Scilly Isles, and has been exhibited to the Zoological Society by Mr. W. B. Tegetmeier. Dr. Günther refers it to a variety of *Anguilla vulgaris*, called *A. Cuvieri*, by Kaup.

February 22. *Cornish Telegraph* contains a notice of the Praed Family, from 1620.

February 22. *Cornish Telegraph* records the recent destruction of a Bittern, in the meadows near Washford, Williton, Somersetshire. The bird measured, when on its feet, 42 inches in height.—Also, that a Glaucous Gull (*Larus glaucus*), a native of Iceland, had been shot at Mainporth, near Falmouth.

February 25. *Western Morning News* states that the Reverend W. Iago had recently recovered, in London, a parish register of Feock, lost many years ago, and recording baptisms, marriages, and deaths during the incumbencies of three vicars (Jackman, Coode, and Ange) between 1671 and 1724.

February 25. *Cornwall Gazette* publishes a biographical notice of the late Mr. Francis Barham, of Bath, a literary gentleman recently deceased.

March 1. *Cornish Telegraph* publishes a letter entitled "More of the Praed Family," and signed "One of the Branches."

March 1. *Cornish Telegraph* publishes an inquiry by Mr. E. H. W. Dunkin, concerning a Sepulchral Urn found at Porth Curnow, St. Levan.

March 2. *Western Morning News* states: "The Rev. W. Iago, of Bodmin, has been invited by the President and Council of the Society of Antiquaries, London, to accept the office of Secretary for Cornwall; and the Society's diploma has been issued, conferring that appointment upon him."

March 4. *Cornwall Gazette* publishes a report of a Lecture delivered by Rev. W. Iago, before the Mayor and Corporation of Bodmin, on the ancient Ivory Casket—the supposed reliquary of the remains of St. Petrock.

March 15. *Cornish Telegraph* publishes, from "Notes and Queries," an article entitled "Cornish spoken in Devonshire."

March 18. *Cornwall Gazette* contains an account of "the building of the Wolf Rock Lighthouse."

March 22, 29, *April* 5. *Cornish Telegraph* publishes "The Building of the Wolf Rock Lighthouse"—a Paper read before the Royal Institution of Great Britain, by Mr. James N. Douglas, Engineer to the Trinity Board.

March 22. *Cornish Telegraph* publishes a notice of "Trengwainton and the Price Family."

April 8. *Western Morning News* has notices of the Solar Phenomenon on Wednesday, April 5th.

May 2. Opening of "The Bishop's Library," at Truro.

May 3. *Cornish Telegraph* states that Mr. J. T. Blight, F.S.A., has in his possession fragments of pottery from the cromlechs of Algiers.

May 3. *Cornish Telegraph* states that a Silvery Hair-tail had been caught at Helford, and that Mr. Charles Fox describes it as two feet long, and like a bar of silver.

May 18. *West Briton* publishes a letter, signed "Curiosus," having reference to the preservation of antiquities; and also a letter signed "A," concerning the Museum of the Royal Institution of Cornwall.

May 20. *Cornwall Gazette* publishes an extract from "Land and Water," from a contribution by Mr. Matthew Dunn, of Mevagissey, on "Marine Life on the Coast of Cornwall."

May 23. Royal Institution of Cornwall, Spring Meeting. Mr. W. Jory Henwood, F.R.S., F.G.S., &c., President, in the chair. The President's Address comprised copious information concerning the Cornish Fisheries, the Metalliferous Deposits of Cornwall, and its Mines and Mining. The following papers were presented:—On a Weapon of Stone found in a Stone Barrow at Pelynt; Mr. John Evans, F.R.S., F.S.A. On Pustulopora clavata of Busk, from the Wolf Rock; Mr. C. W. Peach, A.L.S. Notes on the Ornithology of Cornwall; Mr. E. Hearle Rodd. On the Poll-Tax of 1377; Sir John Maclean, F.S.A. On the Manor of Penvrane and the advowson of St. Pinnock; Sir John Maclean, F.S.A. On the insulation of St. Michael's Mount; Mr. W. Pengelly, F.R.S., F.G.S. On Jews in Cornwall; Rev. J. Bannister, LL.D. On the occurrence of Cobalt in connection with the Tin Ores of Cornwall; Mr. R. Pearce, F.G.S. Description of a Fresco in Ludgvan Church, from the original drawing by Dr. Borlase; Mr. W. C. Borlase, F.S.A. On some Antiquities in East Cornwall; Mr. R. N. Worth. Observations on

Tintagel Castle; Rev. Prebendary Kinsman, M.A. On an extraordinary phenomenon in the waters of the Mediterranean; Mr. R. Edmonds. Rev. W. Iago gave descriptions of an Ivory Casket and a Skippet at Bodmin, and a Forcer and some Tallies found at Lanivet; and observations were made, on the population of Cornwall; Weather Forecasts; Rainfall and Moisture; and recent Solar Phenomena. See *Journal of the Royal Institution of Cornwall*, No. xiii.

May 25. *Western Morning News* contains a notice of the Oratory of St. Gothian, in the parish of Gwithian.

May 27. *Cornwall Gazette* publishes an account of "The Gwithian Relic," *i.e.*, The Oratory of St. Gothian.

June 1. *West Briton* publishes a letter, from Mr. W. Pengelly, Lamorna, Torquay, on "St. Michael's Mount."—Also an account of proceedings at Hayle, for preservation of "The Oratory of St. Gothian."

June 2. *Western Morning News* publishes a letter signed "W. I.," concerning Ordinations in Cornwall.

June 3. *The Antiquarian* contains an article, by "E. H. W. Dunkin," on "St. Gothian's Oratory, Cornwall."

June 7. *Western Morning News* publishes, from the *Exeter Gazette*, a notice of a Fresco discovered in the Lady Chapel of Exeter Cathedral.

June 8. *West Briton* publishes a letter signed "Observer; subject: "The Scilly Isles a Quenched Volcano."

June 10. *Cornwall Gazette* contains a paragraph concerning Roman Roads in Cornwall.

June 14. *Cornish Telegraph* publishes an account, by the Rev. Frederick Hockin, of "The Ancient Oratory of St. Gothian, at Gwithian."

June 14. *Cornish Telegraph* publishes a communication, from the Rev. Dr. Bannister, on the question: "But were there Jews in Cornwall?"

June 17. *Cornwall Gazette* publishes a letter on "Carew and Shakspeare," from "J. B.," St. Day,—Also a letter on "Ordinations in Cornwall," from "W. P. W."

June 24. *Cornwall Gazette* publishes a letter on "Perranzabuloe," from "Christopher Cooke," London.—Also a letter entitled "The Scilly Isles a Quenched Volcano," signed "W. B.," Fowey.

July 12. *Cornish Telegraph* publishes a "Copy of the Deed of John Knill," establishing the quinquennial "Knillian Games."

July 15. *Cornwall Gazette* publishes a letter from "Christopher Cooke," on "Rainfall in Cornwall;" and concerning deficiencies, in the British Museum Library, of certain publications relating to Cornwall.

July 19. *Cornish Telegraph* publishes a communication, from "J. C. S., Lelant," on "Tre Crom or Croven Hill," near Hayle.

July 22. Death of Sir Thomas Dyke Acland, Bart., at Killerton, near Exeter, aged 84, having held the baronetcy 77 years. (A memoir of the deceased, with some notice of the Acland Family, in the *Western Morning News*, July 24).

July 24. The Classes of the Miners' Association of Cornwall and Devon visit the Providence Mines, Lelant, and are entertained at dinner in the Account-house; Mr. Warington W. Smyth, F.R.S., presiding.

July 27. *West Briton* publishes a letter signed "Inquirer," on "The Insulation of St. Michael's Mount."

July 29. *The Antiquary* contains a paper "On a circle of stones, called the Dawns Mên, near the Land's End."

July 31. *Western Morning News* quotes from "*Land and Water*," an account by Mr. Matthias Dunn, of Mevagissey, of the recent capture of a Torpedo at that place, in a ground seine.

August 2. *Western Morning News* publishes an account of "The Gwavas Manuscripts."

August 2, *and following days.* 41*st Annual Meeting of the British Association, at Edinburgh;* President, Professor Sir William Thompson. Among the Papers read were the following:—Seventh Report of the Committee for the Exploration of Kent's Cavern; Mr. W. Pengelly. On the said-to-be Tailless Trout of Islay; Mr. C. W. Peach. The influence of the Moon on the Rainfall; Mr. W. Pengelly. Additions to the list of Fossils and Localities of the Carboniferous Formation in and around Edinburgh; Mr. C. W. Peach.

August 8. *Western Morning News* publishes a description of the new Longships Lighthouse, Land's End.

August 8. Meeting of the British Medical Association, at Plymouth; Mr. Whipple, of Plymouth, President.

August 12. Royal Cornwall Polytechnic Society. 39th Annual Meeting; Mr. Charles Fox presiding.

August 14. Members of the British Medical Association visit St. Michael's Mount, and, on invitation from Mr. Congdon, of Marazion, partake of a déjeuner in the Chevy Chace Room, by permission from Sir Edward St. Aubyn, Bart.

August 14. *Western Morning News* publishes a letter signed "H. W.", on "The Gwavas Manuscripts."

August 14. Miners' Association of Cornwall and Devonshire. Annual Meeting at Falmouth; Mr. A. Pendarves Vivian, M.P., presiding. A Paper on "The comparative health and longevity of Cornish Miners" was read by Mr. Robert Blee, of Truro.

August 14 *and* 15. Royal Institution of Cornwall. Excursion to Penzance, Botallack, and St. Ives, and to antiquities in the vicinity of these places. (See *Journal of the Royal Institution of Cornwall*, No. xiii, and 54*th Annual Report.*

August 15. Devonshire Association for the Advancement of Science, Literature, and Art. Tenth Annual Meeting, at Bideford; Rev. Canon Kingsley, M.A., F.L.S., F.G.S., President. The following papers were read:—A Brief Sketch of the Early History of Bideford; J. A. Parry. The Fall and Restoration of the Cromlech at Drewsteignton, 1862; G. Wareing Ormerod, M.A., F.G.S. Notes on the Population of Devonshire; A. Hamilton. On the name *Britain* and the Phœnicians; Richard Edmonds. Notice of the firing at the Battle between the Alabama and Kersage, off Cherbourg, June 19th, 1864, being heard in Devon; G. Wareing Ormerod, M.A., F.G.S. The Rainfall on the low lands of the Estuary of the Taw; N. Whitley, F.M.S. On certain instances of concentric lamination observed amongst the pebbles on Northam Ridge; Townsend M. Hall, F.G.S., &c. Is the Cavern at Pridhamsleigh, near Ashburton, worth exploring? J. S. Amery.

Was Britain the island of the Hyperboreans mentioned by Diodorus Siculus, in a passage supposed to be quoted from Hecatæus? W. Pengelly, F.R.S., F.G.S. On a second Fossil Tooth found at Sidmouth; P. O. Hutchison. On the Boring of Molluscs, Annelids, and Sponges into rocks, wood, and shells; Edward Parfitt. The Literature of Kent's Cavern. Part III; W. Pengelly, F.R.S., F.G.S. On the Præ-historic Antiquities of Dartmoor; C. Spence Bate, F.R.S., &c. On the Clitter of the Tors of Dartmoor; C. Spence Bate, F.R.S., &c. A Contribution towards determining the Etymology of Dartmoor Names; C. Spence Bate, F.R.S., &c. Notes on the existence of Præ-Cretaceous Sponges; W. Pengelly, F.R.S., F.G.S. The Fauna of Devon; Part VII., Crustacea—Sub-Class Cirripedia; Edward Parfitt. A History of Lundy Island; J. R. Chanter. Notes on the Geology and Mineralogy of the Island of Lundy, with some remarks on its relation to the mainland; Townsend M. Hall, F.G.S., &c. Further considerations of the Influence of the Moon on the Rainfall; W. Pengelly, F.R.S., F.G.S. Notes on the Præhistoric Archæology of East Devon, Part IV.; Rev. R. Kirwan, M.A., F.E.S., Rector of Gittisham. The Rainfall in Devonshire in 1870, and in the five years ending with December 31st, 1870; W. Pengelly, F.R.S., F.G.S. The Rainfall on the St. Mary Church road, Torquay, during the seven years ending with December 31st, 1870; W. Pengelly, F.R.S., F.G.S.

August 17. *West Briton* records the recent discovery of a beautiful specimen of *Onopordum Acanthium*, in Ludgvan, by the Misses Hebe and Sophia Rogers.

August 23. *Western Morning News* contains an article on the "Exeter Cathedral Rood Screen;" and also records that the ancient Gateway at Fitzford, Tavistock, is in process of restoration by the Duke of Bedford.

September 4. An Exhibition of Fine Arts, at the St. John's Hall, Penzance, in connection with the Penzance School of Art.

September 20. *Cornish Telegraph* records the recent capture of a "Yellow-shanked Sandpiper" *(Totanus flavipes)* near Marazion Bridge.

September 21. *West Briton* contains, under the head "Cornubiana," a communication, signed "Tre," concerning "Cadson Bury," and places in its vicinity.

September 22. *Western Morning News* publishes the following letter, from Mr. Rogers, of Penrose:—On the 30th of August I observed several cones recently formed on my best *Cedrus Deodara*. The tree is 30 years old, having been planted in 1841 in a sheltered situation. It is now about 30 feet high, stem four feet in circumference at three feet from the ground, and branches at base 120 feet round; a well-balanced and healthy specimen.—The cones were less than an inch high when I first observed them, and of the same glaucous hue as the foliage; the largest cone is now 1½ inches high, and some are becoming slightly browned. I cannot detect any male catkins. More than 100 cones are visible, chiefly on the lower half of the tree. Other choice varieties of fir are coning here this year, *e.g.*, Webbiana, Morinda, Cephalonica. The Deodara has coned at Dropmore, Bicton, and elsewhere, but I am not aware of seedlings having been raised from English cones; and I shall be glad to know of other instances of cones in Cornwall.

September 23. *Western Morning News* records that a great or Solitary Snipe *(Scolopax major)* had recently been shot in the parish of Morley.

September 23. *Cornwall Gazette* publishes a notice of "Richard Trevithick," from "Christopher Cooke, London."

September 30. *Western Morning News* records that "in the grounds of Mr. J. Vowler, Parnacott, is a specimen of the *Araucaria imbricata*, thirty years old, and about twenty-five feet high, which has this year produced cones for the first time. The tree is a female; the cones, twelve in number, are four to five inches in length, and are hedgehog-like masses of yellow-green spines, each spine being set in the imbricated spiral of the leaves, and a thick white resin constantly oozes from amongst them."

October 4. *Cornish Telegraph* publishes a letter, signed "W.B.", and entitled "The use of a Quoit," concerning 'a fallen cromlech known in Zennor and its vicinity as Bosperhenas Great Quoit."

October 5. The 59th year's Proceedings of the Plymouth Institution inaugurated by the President, Dr. C. A. Hingston.

October 10. A Spoonbill *(Platalea leucorodia)* shot at Lizard-town, in a gutter.

October 12. Mr. Spence Bate, F.R.S., delivered a lecture at the Plymouth Athenæum, on "Præ-historic Dartmoor."

October 16. *Western Morning News* publishes a letter, signed Inquirer, Liskeard," on "Præ-historic Dartmoor," and the Gaelic origin of certain Dartmoor names.

October 19. *West Briton* publishes a paper "On the name Britain, and the Phœnicians," by Mr. Richard Edmonds.

October 27. *Western Morning News* publishes letters, by "Thomas Stratton," Stoke, and "M," on the derivation of "Iktin;" and a letter, signed "S.B.", on "Præ-historic Dartmoor."

October 28. *Western Morning News* publishes a letter, on "Præ-historic Dartmoor," and the name "Cad," from "Plymouthian."

October 30. *Western Morning News* publishes a letter, signed "S.B.", on "Præ-historic Dartmoor" and the name "Cad." And on *October* 31st, letters on "Præ-historic Dartmoor," from "Plymouthian;" "M.A. of Oxford," Exeter; "R.N.W;" and "D."

October 31. Death of Mr. William Rashleigh, of Menabilly and Point Neptune; formerly M.P. for East Cornwall. A memoir of the deceased, and of his ancestry from the 16th century, has been reprinted from the *West Briton* of November 9, 1871. He was buried in a rock tomb which he had caused to be excavated on the summit of St. Catherine's Hill, Fowey.

November 1. *Western Morning News* publishes a letter concerning the Bodmin Casket, from Rev. W. Iago, Secretary for Cornwall to the Society of Antiquaries, London.

November 3. Royal Geological Society of Cornwall. 58th Annual Meeting, at Penzance; Mr. Hugh Seymour Tremenheere, C.B., F.G.S., President, in the chair. Among Papers read was one by Mr. Whitley, C.E., on "The Geology of Mount's Bay." The Secretary read a note which accompanied a present from Mr. R. Pearce, of pitchblende or oxide of uranium found by him in Colorado.—Mr. Peach sent examples of glaciated quartz from Gorran, and expressed a hope that some gentleman would give attention to the evidences of glacial action in Cornwall.—Mr. Warington Smyth was elected President.

November 3. *Western Morning News* publishes a letter on "Pre-historic Dartmoor," from "S.B." Also, a letter, from "M," on the Bodmin Casket."

November 4. *Cornwall Gazette* publishes a letter, from "Christopher Cooke," London, on St. Michael's Mount, and the lines in Milton's "Lycidas":

> "Or whether thou, to our moist eyes deny'd,
> Sleep'st by the fable of Bellerus old,
> Where the great vision of the guarded Mount
> Looks toward Namancos and Bayona's hold;
> Look homeward, angel, now, and melt with ruth."

November 4. *Cornwall Gazette* notices a lecture recently given at Bodmin by Rev. W. Iago, on "The Vestiges of Early Inhabitants." The lecturer treated of rock testimony, wild beasts of the West of England, cannibals, caves, crannoges, fogous, cromlechs, circles and holed stones, earthworks, implements, weapons, ornaments and inscriptions, and evidences in foreign countries compared with the vestiges found in Cornwall.

November 6. *Western Morning News* publishes letters on "Præ-historic Dartmoor," from "G. W. O.", Teignmouth; "H.", Hyde Park Terrace, Mutley; and "J.J.C."

November 8. *Western Morning News* publishes a letter, signed "F.H.", on the river name "Thames;" and a letter on the "Bodmin Casket," from "E. H. H. Shorto," Clerk of St. Petrock, Exeter.

November 9. *Western Morning News* publishes a letter on the "Bodmin Casket," signed "W.I.", Bodmin.

November 15. Royal Institution of Cornwall. Annual Meeting; Mr. W. Jory Henwood, F.R.S., President, in the chair. A letter was read, from Sir John Maclean, concerning a chapel in Trevalga Church; and observations were made on the Mortality of Miners. The following papers were read: On a Sub-Marine Forest at Market Strand, Falmouth; Mr. H. M. Whitley, C.E. On a British Celt found by Mr. F. Jope Rogers, near Helston; by Mr. Albert Way, F.S.A. On an Urn found at Angrouse, in Mullion; Mr. W. C. Borlase, F.S.A. Mr. J. St. Aubyn, M.P., elected President for the ensuing year. In the evening, in the Institution Lecture-Room, a Conversazione, at which papers were read, on the Physical Geography of West Cornwall, on Botallack Mine, and on the Fishes of West Cornwall; and the Rev. W. Iago gave an account of Antiquities visited during the Autumn Excursion, and of an Alabaster Carving at Mabe. (See *Journal of the Royal Institution of Cornwall*, No. xiii., *and 54th Annual Report*).

November 16. *West Briton* publishes "Cornish Historic Tracts," I., from E. H. W. Dunkin, Kidbrooke, Blackheath.

November 18. *Cornwall Gazette* publishes a letter, signed "M.," on St Michael's Mount," and the names "Mictis" and "Ictis."

November 25. Oxford Local Examinations. Presentation of Prizes and Certificates at Truro, by Mr. Herbert W. Fisher, Vice-Warden.

November 30. *West Briton* publishes a letter, from "Curiosus," on the "Bodmin Casket," and "the Lykanthropist."

December 1. *Western Morning News* publishes a Lecture, by Rev. W. Iago, on "The Bodmin Casket."

December 9. *Cornwall Gazette* publishes a letter, from "Christopher Cooke," on "Cornish Relics," recording, as from the writer's personal observation, the Stone Monuments in Cornwall extant in 1871.

December 16. *The Antiquary* contains an article, by "E. H. W. Dunkin," on "The Bodmin Ivory Casket."

Decemder 23. *Cornwall Gazette* publishes a letter, signed "The Mother of the Maidens," concerning "The Nine Maidens" near St. Columb; "The Druids' Altar" near St. Issey; and a Cromlech in the parish of St. Breock.

EDINBURGH MEETING OF THE BRITISH ASSOCIATION.

EXPLORATIONS IN KENT'S CAVERN.—Mr. PENGELLY gave in the "Seventh Report on the Explanations in Kent's Cavern."

Since last year, when the committee had reported at Liverpool, they had explored in what was called the first reach of Smerdon's Gallery, and also in the second reach; also, from a point where the work was stopped in 1865 to the Sloping Chamber, and they were now exploring away in the direction of that part of the cavern where the late Mr. M'Enery had found remains.

With reference to the explorations in Smerdon's passage, the report stated that, besides a large number of bones, portions of bones, and fragments of antlers, a total of fully 2900 teeth were found in the passage and its ramifications, of which 700 were reported at Liverpool. The remaining 2200, exhumed since the end of August 1870, belonged to different kinds of animals, in the following ratios:—Hyena, 335 per thousand; horse, 295; rhinoceros, 161; Irish elk, 55; ox, 35; deer, 27; badger, 22; elephant, 20; bear, 18; fox, 12; lion, 6; reindeer, 5; wolf, 4; bat, 2; rabbit, 1; dog, (?), less than 1. This list differed from previous lists referring to other parts of the cave, in containing neither sheep nor pig, and in the diminished prevalence of rabbits and badgers. In various parts of the passage, considerable heaps of small bones, sometimes agglutinated, were found here and there on the surface, or but little below it. In one instance, as many as 8400 were picked out of 120 cubic inches of material. Twelve flint flakes and chips were found in the second reach of the passage; there were none in the first reach, nor in the lateral passages. Compared with the fine specimens met with in previous years, in other parts of the cavern, they were perhaps of but little value. The excavation of Smerdon's passage was completed on December 31, 1870, after very nearly five months had been expended upon it. From its prevalent narrowness, the labour in it had been attended with much discomfort; but probably no branch of the cavern had, on the whole, yielded a larger number of mammalian remains. The report then proceeded to describe the excavations which are being carried on in other parts of the cave.

The CHAIRMAN conveyed the thanks of the section to the committee, and particularly to the Secretary Mr. Pengelly, and said that it was in the contemplation of the Association not only to continue the grant to this committee, but to make it perpetual, and to extend the operations to other bone caverns.

CORRIGENDA.

At Page xi (Report), *line* 10 : *for* at *read* as.

At Page xlvii (Report), *line* 13 : *for* Jeffery *read* Jeffree.

DIRECTIONS TO THE BINDER.

To face Page c. (Report) :—Alabaster at Mabe.

To face Page 44 (Journal) :—"Tintagell—a Borowe."

„ *p.* 46 „ :—Tintagel Church. (View).

Ditto. (Plan).

„ *p.* 50 „ :—Fresco in Ludgvan Church.

„ *p.* 56 „ :—Saint Christopher.

„ *p.* 70 „ :—Inscribed Stones.

„ *p.* 72 „ :—Plan of Earthwork in Northcot Hamlet.

„ *p.* 88 „ :—Polyzoa.

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Whitley, H. M. ..	0	5	0
Williams, Sir F. M., Bart., M.P., *Goonvrea* ..	0	5	0
Willyams, A. C., *Bodrean*	0	5	0

The MUSEUM is open to Members and their families every day, except Sundays, between the hours of Ten and Four o'clock during the Winter, and between Nine and Six o'clock in the Summer.

The Museum is open to the public, free of charge, on the Afternoons of MONDAYS, WEDNESDAYS, and SATURDAYS, from Noon until dusk, during the Winter months, and until Six o'clock in the Summer months. On other days, and previous to Twelve o'clock on the above days, an admission fee of Sixpence is required.

An Annual Subscription of Five Shillings entitles the Subscriber to admission to the Museum on Mondays, Wednesdays, and Saturdays, and to attend all the Meetings of the Society.

A Subscription of Ten Shillings further entitles the Subscriber to introduce to the Museum and meetings all the *bonâ fide* resident members of his family.

A Subscription of One Guinea entitles the subscriber to all the publications issued by the Institution, to admission to the Museum, for himself and family, on every day in the week, and to the meetings of the Society; and to ten transferable tickets of admission to the Museum whenever open.

The "JOURNAL OF THE ROYAL INSTITUTION OF CORNWALL," will be forwarded free of charge to the members subscribing One Guinea Annually. To others it will be supplied on payment, in advance, of Three Shillings a year; or the several numbers may be obtained from the Curator, or from a Bookseller, at Four Shillings each.

ROYAL INSTITUTION OF CORNWALL.

SPRING MEETING,

1872.

This Meeting was held, in the Library of the Institution, at noon on Saturday the 18th of May. The Chair was occupied by the President, Mr. John St. Aubyn, M.P. for West Cornwall; and there were also present, (besides many ladies):—Mr. W. Jory Henwood, F.R.S., and Dr. Jago, F.R.S., Vice-Presidents; Mr. Tweedy, Treasurer; Mr. Whitley, and Rev. J. R. Cornish, M.A., Secretaries; Mr. H. M. Whitley, Assistant Secretary; Dr. Barham, Rev. Dr. Bannister, F.S.A., Rev. W. Iago, L.S., Soc. Ant. Lond., Mr. Alexander Paull, and Mr. H. O. Remfry, Members of the Council; and Mr. J. G. Chilcott, Mr. J. H. Collins, F.G.S., Mr. W. P. Dymond, Mr. H. T. Ferguson, Mr. W. H. Jenkins, (Mayor of Truro), Mr. J. B. Job, Rev. T. Phillpotts, Mr. G. F. Remfry, Mr. H. E. Remfry, Rev. H. S. Slight, Mr. Augustus Smith, Mr. Snell, Mr. S. Symons, Mr. D. G. Whitley, Mr. R. N. Worth.

The PRESIDENT, declining, on this occasion, the delivery of a formal address, made some remarks concerning proposed legislative enactments affecting this County,—the "Mines Regulation Bill," and, (more germane to the objects of this Institution), a Bill prepared by Sir John Lubbock, but not before Parliament, "to provide for the better preservation of historical monuments and objects of antiquity in Great Britain and Ireland."

The Bill relating to the Regulation of Mines had been brought on in three successive sessions of the House of Commons, and its provisions had been frequently discussed in this County. It had been subjected to various alterations and (as was considered in Cornwall) improvements; it having been the endeavour of the Cornish Members, either by conference with the Minister in charge of the Bill, or by ordinary process in the House of Commons, to have such amendments introduced as would suit the requirements

of this county; and he trusted that the measure, when passed, would give satisfaction to all classes concerned. The Bill had been re-committed for the purpose of being reprinted after the introduction of amendments by the Government. That reprint had not yet been issued, and consequently he was unable to state what the new clauses were. Subject, however, to those alterations, the following were the objects of the Bill.—At its very commencement, there was a provision that no child under 10 years of age, and no woman of any age, should be employed underground. Then followed clauses relating, partly to the employment of male young persons in mines, and partly to educational provisions as regards boys. Concerning these clauses, and especially with regard to the educational provisions, there were matters of difference between the Cornish Members and the Government, which, however, it was hoped, might ere long be settled. Then there were some very important clauses having reference to the payment of wages; but it was understood that these would be eliminated in order that they might be introduced into the Master and Workmen's Bill now before Parliament, and which had important bearings on the relations between employer and employed in this county. That measure had been referred to a Select Committee. He was glad to say that (the other members for the county having their hands full), Sir John Trelawny had undertaken to serve on that Committee, for the representation of Cornish interests therein; and he was quite sure that the interests of all classes in Cornwall, both of employers and of employed, would be perfectly safe in the hands of that honourable baronet, who had given the utmost attention to the matter; and the other members in the county would be very glad to follow his lead and guidance in that respect. Another clause in the Mines Regulation Bill provided for the fencing of shafts, in order to the prevention of serious and often fatal accidents. It had been found almost impossible to enact that every shaft shall be immediately closed; but it was hoped that the compromise proposed by the Cornish members, and which the Government had adopted, would prevent accidents of that kind in future, on abandoned mines. Then there were some general clauses for the safety and comfort of people employed within our mines. First of all there was a clause—though he could not say he was sanguine as to its legislative operation—providing that there shall be an adequate amount of ventilation secured. There were also clauses relating to the use of gunpowder in mines, and to prevent the use of iron instruments in charging holes for blasting; and others having reference to the fencing of old shafts on mines actually in working, to the fencing and securing of entrances to shafts, and

to the fencing of machinery and wheels so that the men's clothes might not catch in them. Provision indeed was made for the protection of human life in every way. All these clauses had been specially considered by the county, and by the Committee acting on behalf of the county; and he believed that, with a few trifling amendments which were entered in his name, they would be found to be unobjectionable, that they would add materially to the safety of the miner, and be the means of preventing many accidents. There were other clauses, relating to plans and maps of mines.

Mr. St. Aubyn next proceeded to speak of the Bill prepared by Sir John Lubbock for the better preservation of historical monuments and objects of antiquity in Great Britain and Ireland. The Bill had not yet been brought before the House of Commons, but a Draft Copy had been forwarded to the various scientific institutions in the country, in order that public feeling in relation to its provisions might be elicited. It contained 22 Clauses, and its object was fully indicated in the preamble: "*Whereas many monuments, and other remains of antiquity, relating to the former condition and early history of Great Britain and Ireland have of late years been removed, injured, or destroyed, and it is expedient that those monuments and antiquities which still remain should be protected from further injuries, be it therefore enacted as follows.*" The Bill proposed, in the first place, to appoint a Commission, to consist of the First Commissioner of Works, the Presidents of the Societies of Antiquaries of England and Scotland, the President of the Royal Irish Academy, the Keeper of British Antiquities in the British Museum, and two or three other persons named in the bill—to be called the "National Monuments Preservation Commission." Annexed to the Act would be a Schedule, to contain the names of all monuments of antiquity which any county or local society might think ought to be inserted; and all monuments so scheduled would be subject to supervision by the Commission. It was also provided that the Commissioners should be able to take any other monument under their care, on giving notice to the Clerk of the Peace for the County, and to the owner or reputed owner and to the occupier of the land whereon the monument stood; and on their causing proper notice to be placed on the parish church. What was meant by being under control of the Commissioners was, that they would have power to put railings or fences round all the scheduled monuments; and any person removing or injuring the monuments or fences would be liable to fine, or to imprisonment for a period not exceeding three months. If the owner or occupier of the land should wish to remove, alter, or destroy any such monument, he would have to

give notice to the Commissioners, who might then, within a month, refuse to consent. If they did not refuse, the owner or occupier might proceed to deal with it as he proposed; but if they notified their refusal, the owner or occupier would not be allowed to interfere with the monument. Then there were compensating clauses; and there was a clause which provided that the Commissioners should have access to those monuments, either for themselves or for persons whom they might authorize, at any hour of the day or night, if necessary for the protection of such monuments.

Mr. St. Aubyn said he feared there would be great difficulty in carrying such a Bill into operation. It interfered—he would not say with the duties, because he held it to be the duty of every person upon whose land a monument of this kind was found, to preserve it—but it certainly interfered with the rights of private property to an extent which it was not likely would be accepted. For example, the Cross on St. Michael's Mount was only a few yards from the Castle; and under this Bill, the Commissioners might be enabled to put up a railing which would disfigure the place, and to prevent all access to it by others, while they claimed perpetual access to it for themselves. This would create a degree of license which would lead to considerable abuse, and cause numberless quarrels and lawsuits. In Cornwall, this point was one of great interest, for its monuments liable to be scheduled in such a bill were extremely numerous; in fact, he supposed there was not a single parish in the county in which there was not to be found a cross, or some druidical remains, some holy well, cliff chapel, or other monument, to which the schedule would apply. He was afraid therefore that the Bill, as it stood, was too stringent in its provisions. At the same time, he must not be understood as not desiring to give his adhesion to any reasonable and workable scheme for the preservation of our national and historical monuments. He had written to Sir John Lubbock, and had also spoken to him on the subject; telling him of his apprehensions with regard to this county. Sir John Lubbock's reply held out some prospect of amendment, but did not state what direction that amendment would take. Sir John said: "In consequence of the suggestions we have received, the Bill has been "considerably modified in form, and indeed re-drawn, though not "much altered in substance. Sir Roundell Palmer, Mr. Bouverie, "and Mr. Beresford Hope will put their names at the back of the "Bill, if we can get Mr. Lowe's consent to its introduction. With "this object we have sent him a copy, and are now waiting his "reply." Now, considering that this was written on the 4th of May, and that no reply had yet been received, it was probable

that they would find it difficult to obtain Mr. Lowe's consent to the introduction of the measure; but, even should that gentleman give his sanction, it was possible that he would insist on considerable alterations. Sir John Lubbock said further in his note: "We have many promises of support, but it is not easy to com- "plete the schedule satisfactorily. I wish you could let us have "your views about the Cornish examples." As this subject was one which much interested and affected this Institution, he was quite sure that Sir John would only be too glad to be furnished with their opinions respecting it.

The President then laid before the meeting an interesting tabular statement of the produce and price of Pilchards from 1815 to 1872, compiled by Mr. Roberts of Penzance, which had been handed to him by Mr. Henwood. Previously they had had no figures anterior to 1833. The highest price realized was in 1815, when 15,000 hogsheads were exported, at from 100s. to 102s. per hogshead. The exports and prices varied considerably. In 1829 only 700 hogsheads were exported, while in 1871 the exports amounted to 45,682 hogsheads. It was curious to see how the prices went down, during last year, as the fish increased. They began at 68s., but as the season went on, they were lowered to 52s., 40s., 37s., and leaving off at 25s. At the present moment advertisements were appearing in the papers offering cured pilchards for manure, at 7s. per hogshead; after being brought back from Italy, where the market was glutted.

Mr. H. M. WHITLEY read the Lists of Presents :—

DONATIONS TO THE MUSEUM.

Pyrites, with Chalybite and Earthy Oxide of Iron, from Dolcoath Mine, 236 fm. level ...	Capt. W. Provis.
Steatite from a Vein in Serpentine Rock, at Coverack.	Mr. J. H. Collins, F.G.S.
Yellow Ochre, from Knightor and Treverbyn Iron Mines, St. Austell.	Ditto.
Murchisonite, a variety of Orthoclase Felspar, from the Triassic Rocks of Dawlish.....	Ditto.
Orthoclase Felspar, from the Glass Mine, Roche	Ditto.
Fossils from Madeira	Mr. G. F. Remfry.
Fossils from the locality of Lisbon	Ditto.
Cork-Tree Sprig and Bark, from Cintra, Portugal	Ditto.

Photograph of a Balk of Yellow Fir drifted ashore on the South Coast of the Isle of Wight, March, 1872. It measured about 40 feet in length, and 22 inches in each direction, and it was densely coated with thousands of *Lepas anatifera*	Mr. Albert Way.
Raniceps Trifurcatus, or Tadpole Fish, rare on the Cornish Coast, and hardly known elsewhere. Brought to C. Fox, by a Durgan fisherman, 3 | 5 | 1872.....	Mr. Charles Fox.
Larva of Dyticus marginalis (a large Water Beetle) found by Alfred Hamilton Jenkin, at Parcvean, near Trewirgie, Redruth, in a stagnant pool, and was observed to feed voraciously on Tadpoles*	Mr. Hamilton Jenkin.
Batrachus Surinamensis, Cuv.; from South America, 1846	Mr. W. P. Cocks, Falmouth.
Arca Noæ, Linn.; Mactra glauca, from Hayle Sands, August, 1846; Hippothoa catenularia; Kellia rubra, and various other Shells, &c.	Ditto.

ADDITIONS TO THE LIBRARY.

The Metalliferous Deposits of Cornwall and Devon: with Appendices on Subterranean Temperature; the Electricity of Rocks and Veins; the Quantities of Water in the Cornish Mines; and Mining Statistics; forming Vol. V. of the Transactions of the Royal Geological Society of Cornwall. By William Jory Henwood, F.R.S., F.G.S., Mining Engineer; Member of the Institution of Civil Engineers; of the Geological Society of France; Hon. Member of the Yorkshire Philosophical Society; Cor. Mem. of the Plymouth Institution, and of the Lyceum of Natural History, New York; and sometime Her Majesty's Assay Master and Supervisor of Tin in the Royal Duchy of Cornwall, and Secretary of the Royal Geological Society of Cornwall. 1843....	From the Author.

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* Accompanying this present was the following note from Mr. F. T. Hudson: "The Larva of *Dyticus marginalis* lives in stagnant waters, and attains a length of about two inches before it undergoes the metamorphosis to a Beetle, about an inch and a quarter long. The Larva and Beetle are both voracious. Although the Beetle lives in water, it has the power of flight. It is common over most parts of England, and is often caught on the wing in the evening."

The London, Edinburgh, and Dublin Philosophical Magazine, and Journal of Science. Fourth Series. From No. 282, December, 1871, to No. 287, May 1872	From Mr. Henwood, F.R.S., &c.
Parochial and Family History of the Deanery of Trigg Minor. Part IV, 1871. (Egloshayle). By Sir John Maclean, F.S.A., Member of the Royal Archæological Institute of Great Britain and Ireland, Honorary Member of the Royal Institution of Cornwall, &c.....	Ditto.
The History of Polperro, a Fishing Town on the South Coast of Cornwall; being a description of the place, its people, their manners, customs, modes of industry, &c. By the late Jonathan Couch, F.L.S., &c., &c. With a short account of the life and labours of the Author, and many additions on the popular antiquities of the district. By Thomas Q. Couch, F.S.A., MDCCCLXXI.	Ditto.
On the Temperature of the Sea, and its influence on the Climate and Agriculture of the British Isles. By Nicholas Whitley, F.M.S. Reprinted, by permission, from the Bath and West of England Agricultural Journal, Vol. XVI. (Twelve Copies).	From the Author.
Ordnance Survey. Abstracts of the Principal Lines of Spirit Levelling in England and Wales. By Colonel Sir Henry James, R.E., F.R.S., &c., Director of the Ordnance Survey. Published by order of the Secretary of State for War. 1861	From Major General Sir Henry James, R.E., F.R.S., &c.
Ordnance Survey. Ditto. Ditto. (Plates)	Ditto.
On Photo-Zincography and the Photographic Processes employed at the Ordnance Survey Office, Southampton. By Captain A. De C. Scott, R.E., Under the direction of Colonel Sir Henry James, R.E., F.R.S., &c. 1863.....	Ditto.
Abstracts from the Meteorological Observations taken at the Stations of the Royal Engineers in the years 1853-4, 1854-5, 1855-6, 1856-7, 1857-8, and 1858-9. Edited by Colonel Sir Henry James, R.E., F.R.S., M.R.I.A., F.G.S., &c. Director of the Ordnance Survey and Topographical Department of the War Office. 1862	Ditto.
Notes on the Great Pyramid of Egypt, and the Cubits used in its design; by Colonel Sir Henry James, R.E., F.R.S., Director General of the Ordnance Survey. 1869 ..	Ditto.

Determination of the Positions of Feaghmain and Haverfordwest, Longitude Stations on the Great European Arc of Parallel. Being an Appendix to the Account of the Principal Triangulation of Great Britain and Ireland. By Captain A. R. Clarke, R.E., F.R.S., under the direction of Colonel Sir Henry James, R.E., F.R.S., &c., Cor. Mem. of the Royal Geographical Society of Berlin, Director of the Ordnance Survey. 1867 ..	From Major General Sir Henry James, R.E., F.R.S., &c.
Note on the Block of Tin dredged up in Falmouth Harbour. By Major-General Sir Henry James, R.E., Director-General of the Ordnance Survey. From the Transactions of the Royal Archæological Institute of Great Britain and Ireland. 1872	Ditto.
Neota. By Charlotte Hawkey	From the Authoress.
Monthly Notices of the Royal Astronomical Society. Vol. XXXII. No. 4, February, 1872. Report of the Council to the Fifty-Second Annual General Meeting	From Mr. Edwin Dunkin.
The Western Chronicle of Science. Edited by J. H. Collins, F.G.S., &c., &c. Vol. I. Nos. 11-13, November, 1871, to January, 1872.....	From the Editor.
Remarks on the Successive Mining Schools of Cornwall. By J. H. Collins, F.G.S.....	From the Author.
Map of the St. Agnes Mining District, 1870. By R. Symons and Son, Surveyors, Truro.	From Mr. R. Symons.
Geological Map of Caradon and Ludcott Mining Districts, 1863. By Brenton Symons, Land and Mineral Surveyor, Truro	Ditto.
Map of Camborne, Illogan, Redruth, and Gwennap Mines. By Robert Symons and Son, Mineral Surveyors, Truro	Ditto.
Geological Map of the Crowan and Wheal Abraham Mining Districts, 1864. By Brenton Symons, Mining Engineer, Surveyor, &c., London	Ditto.
The Miners' Association of Cornwall and Devonshire. Report, 1871.....	From the Association.
Report and Transactions of the Devonshire Association for the Advancement of Science, Literature, and Art. Vol. II. Part II. 1871	From the Association.
The Thirty-Ninth Annual Report of The Royal Cornwall Polytechnic Society. 1871.	From the Society.
Journal of the Liverpool Polytechnic Society. Annual Report for 1871 ..... Meeting, Dec. 18, 1871..... Do. Jan. 29, 1872 ..... Do. Feb. 26, 1872	Ditto.

Proceedings of the Society of Antiquaries of London. Second Series. Vol. V. No. II, December 8, 1870, to March 23, 1871.	
Ditto. Ditto. No. III, March 23, to June 8, 1871	From the Society.
Proceedings and Papers of the Kilkenny and South-East of Ireland Archæological Society. No. 35, January, 1862	
Ditto Ditto No. 40, April, 1863.....	
Ditto Ditto No. 49, July, 1865	
Ditto Ditto No. 50, October, 1865....	
Ditto Ditto No. 58, October, 1867....	Ditto.
The Journal of the Royal Historical and Archæological Association of Ireland. Vol. I. Fourth Series, October, 1871, No. 8	
Ditto January, 1872, No. 9	Ditto.
Proceedings of the Bristol Naturalists' Society, for 1871. New Series, Vol. VI	Ditto.
The Fifty-First Report of the Council of the Leeds Philosophical and Literary Society, for 1870-1	Ditto.
Report of the Council of the Anthropological Institute of Great Britain and Ireland for 1871.....	From the Institute.
The Journal of the Anthropological Institute of Great Britain and Ireland. Vol. I, No. III, January, 1872	Ditto.

From the Commissioners of Patent Inventions:—

Various Numbers of the Chronological and Descriptive Index of Patents applied for and granted; and many Volumes of Abridgments of Specifications of Patented Inventions.*

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* There are now in the Institution Library:—

By Bennet Woodcroft, Clerk to the Commissioners of Patents.

Descriptive Index of Patents applied for and Patents granted, being the Abridgments of Provisional and Complete Specifications. For the Quarters ending, 31st March, 30th June, 30th September, 31st December, 1867; and 31st March, 30th June, 30th September, 31st December, 1868.

Chronological and Descriptive Index of Patents applied for and Patents granted, containing the Abridgments of Provisional and Complete Specifications. For the Quarters ending 31st March, 30th June, 30th September, 31st December, 1869; and 31st March, 30th June, 30th September, 31st December, 1870.

Ditto ditto. Weekly Numbers, from January 1 to May 10, 1871.

Abridgments of Specifications:—

Acids, Alkalies, Oxides, and Salts. A.D. 1622—1866.
Aeronautics. A.D. 1815—1866.

From the University of Christiania:—

Repräsentation der Imaginären der Plangeometrie (Fortsetzung). Von Marius Sophus Lie.

Christiania Omegns Phanerogamer og Bregner med Angivelse af deres Udbredelse, samt en Indledning om Vegetationens Afhængighed af Underlaget. Af A. Blytt, Conservator. 1870. With "Résumé pour les Etrangers."

Thomas Saga Erkibyskups. Fortælling om Thomas Becket Erkebiskop af Canterbury. To Bearbeidelser samt fragmenter af en Tredie. Efter Gamle Haandskrifter udgiven af C. R. Unger, 1869.

Aids to Locomotion. A.D. 1691—1856.
Bleaching, Dyeing, and Printing Calico and other Fabrics, and Yarns. A.D. 1617—1857.
Books, Portfolios, Card-Cases, &c. A.D. 1768—1866.
Bricks and Tiles. A.D. 1619—1860.
Ditto A.D. 1861—1866.
Bridges, Viaducts, and Aqueducts. A.D. 1750—1866.
Carriages and other Vehicles for Railways. A.D. 1807—1866.
Drain Tiles and Pipes. A.D. 1619—1855.
Electricity and Magnetism, their Generation and Applications. A.D. 1766—1857.
Ditto ditto A.D. 1858—1866.
Fire-Arms and other Weapons, Ammunition, and Accoutrements. A.D. 1588—1858.
Ditto ditto A.D. 1858—1866.
Furniture and Upholstery. A.D. 1620—1866.
Hydraulics. A.D. 1617—1865.
(No. II out of print).
India-Rubber (Caoutchouc) and Gutta Percha; including Air, Fire, and Water Proofing. A.D. 1627—1857.
Lace, and other Looped and Netted Fabrics. A.D. 1675—1864.
Lamps, Candlesticks, Chandeliers, and other Illuminating Apparatus. A.D. 1637—1866.
Manufacture of Steel and Iron. A.D. 1621—1754.
(*Carent*, Parts II and III.)
Manufacture of Iron and Steel, Part IV. A.D. 1857—1865.
Manure. A.D. 1721—1855.
Marine Propulsion (excluding Sails). A.D. 1618—1857.
Medicine, Surgery, Dentistry; including Artificial Limbs, Teeth, &c., Apparatus for Invalids, Medical Baths, Veterinary Preparations, &c. A.D. 1632—1861.
Metals and Alloys (excepting Iron and Steel). A.D. 1681—1859.
Music and Musical Instruments. A.D. 1694—1861.
Ditto ditto A.D. 1694—1866.
Needles and Pins. A.D. 1755—1866.
Oils, Animal, Vegetable, and Mineral, including Lubricants, Candles, and Soap. A.D. 1617—1863.
Paper, Pasteboard, and Papier Maché. A.D. 1665—1851.
Ditto Part ii. Cutting, Folding, and Ornamenting; including Envelopes, Cards, Paper Hangings, &c. A.D. 1692—1857.
Photography. A.D. 1839—1859.
Ditto (Part ii). A.D. 1860—1865.

Beretninger om Norges Deeltagelse i den almindelige Industri-Udstilling i Stockholm 1866, og i Verdensudstillingen i Paris, 1867.

Om de Geologiske Forhold paa Kyststrækningen af Nordre Bergenhus amt. Af M. Irgens og Th. Hiortdahl. (Note. With "Résumé pour les Etrangers.")

Fortegnelse over de af Fiskeri-Inspektor for de norske Ferskvandsfiskerier M. G. Hetting ved det 13de almindelige Landbrugsmode August, 1871, i Goteborg udstillede Gjenstande med Anhang: Bortfæste af de den Norske Stat tilhorende fisketomme Vande.*

The Thelemark Race.† By H. Tveter, Agronome.

Almindelig Norsk Huus-Kalender med Primstav og Merkedage. Christiania, 1859.

Plating or Coating Metals with Metals. A.D. 1637—1860.
Ditto ditto (Part ii). A.D. 1861—1865.
Pottery. A.D. 1626—1861.
Ditto A.D. 1862—1866.
Preparation and Use of Food. A.D. 1721—1866.
Preparation and Use of Tobacco. A.D. 1721—1866.
Preparation and Combustion of Fuel. A.D. 1620—1865.
Preservation of Food. A.D. 1691—1855.
Ditto A.D. 1856—1866.
Printing. A.D. 1617—1857.
Ditto A.D. 1858—1861.
Production and Application of Gas (Excepting Gas Engines). A.D. 1681—1858.
Ditto A.D. 1859—1866.
Railways. A.D. 1770—1863.
Railway Signals and Communicating Apparatus. A.D. 1840—1866.
Raising, Lowering, and Weighing. A.D. 1617—1865.
Ditto ditto 1866.
Roads and Ways. A.D. 1619—1866.
Saddlery, Harness, Stable Fittings, &c. A.D. 1625—1866.
Ship-building, Repairing, Sheathing, Launching, &c. A.D. 1618—1860.
Ditto ditto ditto A.D. 1861—1866.
Spinning. A.D. 1624—1863.
Ditto Part ii. 1864—1866.
Steam-Culture. A.D. 1618—1856.
Steam Engine. Part i. Vol. i. A.D. 1618—1859.
Ditto Part i. Vol. ii. A.D. 1618—1859.
Umbrellas, Parasols, and Walking-Sticks. A.D. 1780—1866.
Watches, Clocks, and other Timekeepers. A.D. 1661—1857.
Ditto ditto ditto. 1857—1866.
Writing Instruments and Materials. A.D. 1635—1866.

* There is an Appendix, translated into English, on the "Leasing of the waters, not containing fish, belonging to the Norwegian State," so that the lessee shall have during the term of the lease, on condition of introducing fish, the sole right of fishing in such waters.

† The Thelemark Race is described as one of the few, perhaps the only constant race of cattle which Norway possesses. It is a well-defined mountain race, which, as the name denotes, has its home in Thelemark, and is found purest in the upper districts, Siljard, Hvideseid, &c. The animal is small. Full-grown cows rarely attain a greater weight than 6 or 700 lbs. *(a)*;

The following Papers were presented:—

On the Original Use of the Mên-an-Tol, or Holed Stone, in the parish of Madron.—By E. H. Wise Dunkin.

Notes on the similarity of some of the Cornish rock-names and miners' terms to Irish words.—By G. Henry Kinahan, M.R.I.A., &c.

Note on a remarkable balk of timber thickly covered with the Goose Barnacle, (Lepas anatifera, Linn.), drifted ashore in March, 1872, at Ventnor, Isle of Wight.—By Albert Way.

Notes on the Ornithology of Cornwall, from May, 1871.—By E. Hearle Rodd.

On two old Mining Patents.—By R. N. Worth.

Chronicles of the Cornish Saints (VI.—S. Burian).—By Rev. John Adams, M.A.

Chronicles of the Cornish Saints (VII.—S. Crantock).—By Rev. John Adams, M.A.

Mr. H. M. WHITLEY, after reading the lists of Donations, &c., said that those members and friends of this Institution who attended the Excursion to the Cheesewring in 1868,* would remember that they paid a visit to the rock-hewn hut in which

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but they increase considerably in size when put on stronger food, particularly if this takes place at an early age. They are peculiarly a milking breed. On the chief farm at Ladegaardsoen the best milking cows have been of this race of late years; and one cow, "Risoie," milked annually, on an average of the three years, 1868, 1869, and 1870, 685 gallons English measure, with a living weight of about 790 lbs. English weight, that is nearly 9 lbs. of milk for each 1 lb. living weight annually. Usually, however, it is considered satisfactory when a cow weighing 6—700 lbs. *(a)* gives 2000—2500 pots *(a)* of milk on regular good food. A report from Mr. Lindequist (government farm superintendent) for 1866, states that six Thelemark cows, from various districts, each gave more than 3000 pots in one year;—one of them even 3584 pots (761 gallons).—The greatest defect in the Thelemark breed is that it furnishes inferior animals for the slaughter. Ayrshire bulls have been used successfully for crossing, and the mixed progeny has turned out extremely well; and, while the Ayrshire breed, as well in Sweden as in Norway, has of late years fallen into discredit on account of its liability to tubercular disease, no symptom of such disease has been observed in the mixed progeny.

(a) 1 lb.=1.0981 avoirdupois. 1 pot=0.2124 gallon.

* See the "*Fifty-First Annual Report of the Royal Institution of Cornwall,*" p. xxiii.

Daniel Gumb lived and died in the early part of the last century, and on which were cut several diagrams from Euclid. He regretted to inform the meeting that it had been wholly destroyed by quarrymen employed in the neighbourhood.—Mr. HENWOOD asked if there had not been a definite promise from Mr. Warington Smyth, on behalf of the Duchy, that this very interesting memorial should not be injured. Was its destruction a surreptitious proceeding, or had there been an additional grant from the Duchy?—Mr. H. M. WHITLEY replied that it was true that Mr. Warington Smyth had led them to understand that the house would be respected.—In answer to a question from Mr. St. Aubyn, Mr. H. M. Whitley said it had not been destroyed mischievously, but simply to extend the quarries in that direction; for which, he believed, there was no grant. Nothing was known of the destruction until after its accomplishment.

It was understood that the matter would be made the subject of communication with the Duchy; Mr. St. AUBYN remarking that if the act had been done to extend the quarries, the proprietors were responsible.

On the reading of Mr. E. H. W. Dunkin's Paper, on the Original Use of the Men-an-Tôl, in the parish of Madron, exception was taken to Mr. Dunkin's supposition that this perforated stone was a remnant of some ancient sepulchral monument, and that the hole was made for the purpose of enabling a person to enter the kist or chamber on the occasion of burials subsequent to that for which the structure was originally erected, and without interference with the general stability of such structure.—DR. BARHAM (conceiving that Mr. Dunkin's theory rested on a slender foundation), observed that there did not appear to be remains of any ancient structure immediately adjacent to the Men-an-Tôl. The three extant stones were all intact, and were not surrounded by any other stones of moment; and they were placed so accurately in line, the outer stones equi-distant from the middle one, and the whole having, in their direction, such a distinct relation to points of the compass with reference to the place of sunrise on certain days, that it was difficult to believe they were accidental remains of an ancient structure. Again, the holed stone being between other two, it could hardly have been an entrance-stone to the interior of any building. The splaying given to the holed stone might, perhaps, give probability to the opinion that it was used for the purpose of securing victims intended for sacrifice.—With reference to the popular superstition (adverted to by Mr. A. PAULL) that the Men-an-Tôl was a "crick-stone" used for the cure of rheumatic pains and spinal diseases, it was stated, in answer to a question from Mr. St. AUBYN, that the diameter of

the hole was 19 inches; and Rev. W. IAGO said it was certain that a person might pass through the hole, though it would be a tight fit. Mr. Iago considered that the Institution was indebted to Mr. Dunkin for his ingenious theory; although he thought (with Dr. Barham and others) that it was scarcely a satisfactory explanation; and this for the additional reason, that cromlechs were generally imbedded within barrows; and consequently, without some means of access through the barrow, the perforated stone would be useless as a means of entrance to the interior of a kist or cromlech. Mr. Iago further stated that in the Trevelgye Barrow, which had recently been opened under Mr. Copeland Borlase's superintendence, the inhumed body had evidently been deposited finally; and though henceforth it would be found that the corners of the stone had been knocked off, it should be known that this was done to enable Mr. Borlase to get in. A similar treatment of the stone at Trethevy might have been similarly effected for the convenience of some former explorer.

The reading of Mr. Kinahan's paper on the similarity of some Cornish rock-names and miners' terms to Irish words, with extracted instances from its appended glossary, induced from Rev. Dr. BANNISTER an expression of regret that the writer should have relied on Dr. Pryce, whose work was obsolete and full of mistakes and misprints. The paper, however, was ingenious, in the same way as was the occasional derivation of English names from Hebrew.—Mr. HENWOOD said he had no knowledge of Irish, but he could testify to the general accuracy of Dr. Pryce's Mining Vocabulary. True, it contained some words which were obsolete; but, speaking generally, the work was extremely correct. Of Dr. Pryce's other work he could offer no opinion.—Dr. BANNISTER explained that he was referring to the other work, and not to the Mining Vocabulary.

Dr. JAGO said it had occurred to him that something might be done towards arriving at a better knowledge of the old language of Cornwall by paying attention to the way in which the modern Cornish folk pronounced English, especially with regard to vowels and accents. For instance, the frequent pronunciation, in this county, of the letter *a* like the *ea* in the word steatite, only with the last of these two vowels broader, might possibly be traceable to the pronunciation of ancient Cornish as a living tongue. This is a sound of *a* not recognised in *Williams's Cornish Dictionary.* In accentuation, while the Cornish, at the present day, placed accent on the ultimate or penultimate, and emphasis at or near the end of a phrase, the Irish, in each case, adopted the opposite principle; and thus while, in Cornwall, the name "Lanyon", (Lan = Church,

yon = John), was generally pronounced *Lanyón*, the *y* being a consonant; occasionally, always in the case of Lanyon coit, we say Lanýon, the *y* being a vowel like the *i* in lion. The Brétons, whose language is more akin to the Cornish than to the Irish, only deviate from this pronunciation in giving *i* the sound of *e* in their Lannion. In Ireland it was pronounced Lányon. In Cornwall, as in the rest of England, in the phrase "not long ago," for instance, the emphasis would be placed on the last syllable; but, by the Irish it would be placed on the word *long*.—Dr. BARHAM said the subject to which Dr. Jago adverted was one of wide application, and well worth attention. In Italy, for instance, the ordinary language in the north had a general similarity to French, both in the pronunciation given to vowels and in the accentuation of terminal syllables. And the explanation of this fact, given by Dr. Edwards, was that the habits of organs of speech as originally applied to Celtic languages, had been transferred to the more modern Italian. On the same principle, the ancient Cornish habits of speech had been transferred, in Cornwall, to the pronunciation of English. The subject was, in all respects, a very interesting one for inquiry. It was not confined to the county at large, in comparison with other parts of England; but there were marked differences between the pronunciations of like words in different districts within the county; distinctive habits of speech originating in remote antiquity having been carried on through succeeding generations.—The PRESIDENT said there were magistrates in the Penzance district who had told him that, with their eyes shut, they could tell from what particular parish in that locality witnesses came, so great were the diversities of speech in that small area. He, himself, knew a farmer who said "Buryan Churchtown" in two syllables.—Rev. H. S. SLIGHT considered that much of the local corruption of speech was due to the disposition to substitute easier words for those of like meaning which were more difficult of pronunciation. For example, the word *farrow* (a young pig) was reduced, in Cornwall, to *vear;* the *furrow* end of a plough was called the *vore* end; and a "handful" was called a *yaffel.*

Mr. WHITLEY made some observations concerning a portion of an Inscribed Stone, which he had recently discovered built into a hedge about half-a-mile on the Mabe side of Burnthouse. Mr. Whitley presented a drawing of it, and suggested that possibly the other portion of the stone might be found in the neighbourhood. He had not yet attempted to decipher the inscription.

Mr. WHITLEY also presented to the Institution Five Charts of the surface Temperature of the Sea between Hull and Hamburgh,

and Hull and Copenhagen, which he had prepared from observations kindly furnished to him by some gentlemen of Hull. These Charts showed that the Winter Temperature of the German Ocean is from 6 to 8 degrees lower than that of the open sea around our western shores.

Dr. Barham read the following communications in Natural History, which had been received by him:—

From Mr. Thomas Cornish, Penzance; 11th May, 1872.

"Your specimen of *Raniceps trifurcatus* is a good one, and of full size. The pectoral tubercles are well developed, but will probably be lost to sight when the specimen dries. At present they are plainly to be seen. I see I took my first specimen in April, 1863, in shallow water with rocky bottom. And in the same month, another was taken, among some loose stones at the back of our Pier, by rod and line. I took it again in the Spring of 1866; and I got another specimen, last year. It formerly ranked as one of the *Gobioidæ*, and although now properly classed among the *Gadidæ*, it has many characteristics in common with the Blennies. I consider it a rare fish on our coasts.—Did Mr. Fox notice the peculiar grinding or crushing apparatus in the gullet, consisting of four large hard tubercles covered with teeth, very similar to those of a Ray?"

From Mr. Charles Fox, Trebah; 16th May, 1872.

"Many thanks for thy letter, with a copy of T. Cornish's valuable notice of Tadpole fishes which he had taken. It is remarkable that within a few years several of the rarer fishes, *Trichiurus lepturus*, *Sparus Boöps*, and *Raniceps trifurcatus*, have been taken on our coast. Yarrel has no notice of the *Trichiurus lepturus* having been caught.

"In the Autumn fishery, large quantities of Anchovies (60 maunds at a time) were taken at St. Ives, in the pilchard seines. The Italians would have valued such a catch.

"As I cannot have the pleasure of being present at the Meeting of the Royal Institution of Cornwall on the 18th, I enclose some observations on the Tadpole fish.

"The last *Journal* of the Society gives fresh evidence of the variety, instruction, and permanent interest of its Transactions."

"The Tadpole fish, *Raniceps trifurcatus*, of the *Gadidæ* family, which I have the pleasure of presenting to the Museum of the Royal Institution of Cornwall, was caught in a net in Helford Harbour, on the 3rd instant. It has been rarely taken except on the Cornish coast. Bloch does not mention it in his great work on Fishes (Berlin, 1786). The late diligent and accurate ichthyologist, Jonathan Couch, seems to have met with only one specimen. Dr. Johnstone exhibited a live one to the Newcastle Naturalist Society in 1832; it was caught in Berwick Bay. But your able contributor, T. Cornish of Penzance, informs Dr. Barham that he had taken this fish in Mount's Bay in April, 1863; another in 1866 (also in the spring); and a third in 1871. The colour of the present specimen when caught was black as that of a Tadpole, which it much resembles in form about the head, &c. The eyes are singularly dark. Its appearance is such, that even if served with the finest "Natives" as sauce, it would hardly supplant at table its well-known relative the Codfish. There are numerous small teeth on the

vomer, and also on four separate protuberances (probably connected with the pharyngeal and branchial bones) guarding the entrance of the very thick and tough œsophagus: I found only a small crustacean (in fragments) in the stomach. The longer filaments of the ventral fins seemed to be vascular, and are probably furnished with sensitive nerves. Are the tubercles in the sides, connected with a more abundant supply of mucus on the scales?

In March last, a Durgan fisherman brought to me a *Sparus Boöps* (or Ox-eyed Bream), of which the first recorded British specimen is in your Museum. The visits to our coast, of the *Raniceps*, of the *Boöps*, and of the Silver Hair-tail, seem to beckon us on to dredge south-west in the deep sea, if haply we might draw up living organisms of the Lusitanian region, such as rewarded the labours of Dr. Carpenter and others,—the *Cestum Veneris*, the Japanese *Hyalonoma*, a beautiful subtropical *Dendrophyllia Coral*, are living representations of fossils of the older rocks."

From Mr. Charles Fox, Trebah; May 16, 1872.

"A pair of Hoopoes was seen in this valley, on the 10th, and again on the 13th of March. I had some hope of these birds remaining through the summer, as they showed but little shyness, alighting on the lawn or perching on the lower branches of trees near the same. In Egypt (where I have often seen the Hoopoe) it has from early ages been associated with other symbols of royalty; and, having been thus honoured in the eyes of the people, might naturally look for protection even in bird-killing Britain. C. W. Peach mentions that one was seen in Wigtonshire on the 10th of March last."

Mr. Augustus Smith said the Hoopoe had been again seen at Scilly. Formerly there was hardly a year that it did not visit the Islands; but for the past few years its place seemed to have been taken by the *Golden Oriole*, which had remained so late that he had on some occasions hoped they would breed, and he took great pains to have them kept quiet.—The Hoopoes were particularly tame.

Mr. Collins, on behalf of the Royal Cornwall Polytechnic Society, of which he is Secretary, stated that that Association had determined upon inviting the Institution of Mechanical Engineers to hold their meeting for 1873 in Cornwall. It was felt desirable that it should be held at the same time as the Polytechnic Exhibition; and the latter it was wished should take place, if arrangements could be made, in Truro. A subscription of something like £100 would indemnify the Society against loss, if rooms could be provided free; if not, the rent of the rooms would have to be added. The Polytechnic Society were anxious to have the co-operation of the Royal Institution.—It was decided that the subject should be referred to the Council.

On the subject of Meteorology, Dr. Barham said that, had there been more time at his disposal, he should have been glad to make some remarks on a comparison of observations recorded at

Truro, and at Falmouth. At the latter place, a great deal had been done under Mr. Dymond's superintendence and direction; but it seemed that the difference of the conditions of the observations, especially those of the thermometer, at the two places, made them hardly comparable at present; while fuller information was required before reliable deductions could be made with regard to sea temperature at Falmouth; and it had been thought undesirable to introduce the subject formally, until it could be dealt with more thoroughly. Mr. Dymond was assiduously making observations on sea temperature; and his observations on land temperature were becoming more and more complete.

Exhibiting a diagram of Rainfall in each month since the commencement, in 1838, of observations at Truro, Dr. BARHAM remarked that the month of May, 1871, was, with the one exception of 1844, the driest thus recorded; and that in the months of January and February, 1872, taken together, there had been more rainfall than in the corresponding two months of any previously recorded year. In London and the East of England generally the rainfall in January and February, 1872, was but little above the average. Mr. Glaisher had stated that he did not know any instance of so remarkable a cold period as that ending December 12th, 1871, being followed by so remarkable a warm one as that ending March 18th, 1872. As possibly bearing on the difference of rainfall in the East and West of England, it might deserve notice that the cold of December was much less intense in these parts than about London.

The PRESIDENT announced that the Autumn Excursion had been appointed for the 19th and 20th of August, and its locality the neighbourhood of Newquay.

On motion by Mr. AUGUSTUS SMITH, seconded by Rev. H. S. SLIGHT, thanks were voted to the contributors of Papers and other communications, and to the donors to the Museum and the Library. Thanks were also voted to the President, on a proposition by Rev. T. PHILLPOTTS, seconded by Mr. G. F. REMFRY.

THE AUTUMN EXCURSION.

On Monday and Tuesday the 19th and 20th of August, a numerous party of members and friends of the Institution joined in what proved to be a very pleasant Excursion, on a northernly route from Truro, for inspection of objects of interest, chiefly of antiquarian character, at and near St. Columb Major, St. Mawgan, St. Columb Minor, Cubert, and Perranzabuloe.

In the absence from the county, of the President of the Institution, Mr. John St. Aubyn, M.P., the duties of presidency, during the two days, devolved on Dr. Jago, F.R.S., one of the Vice-Presidents; who received zealous aid from Mr. Whitley, one of the Honorary Secretaries, and other Members of the Council, and from Mr. F. V. Budge, Assistant Secretary.

Starting from the Truro Town Hall at 8 a.m. on Monday, the excursionists were driven, *en route* towards St. Columb, to the "Indian Queen" Inn, and here they found awaiting them, a party from Bodmin, with Mr. T. Q. Couch, F.S.A., and Rev. W. Iago, L.S. Soc. Ant. Lond., as *ciceroni*. In the vicinity of the inn, was inspected an Inscribed Stone mentioned by Dr. Borlase,* and which, after having been long lost sight of, had lately been rediscovered by Mr. Iago. The learned Dr. Borlase gave as its probable date, A.D. *c.* 920, and read its legend: "Ruani hic jacit"; but the letters are now almost obliterated, and, consequently, the reading of them is uncertain.

After a brief visit to an amphitheatre, of recent formation—a sort of modern *plain-an-gwarry*, nearly "touching" the inn, a start, by the now combined forces from Truro and Bodmin was made over the Tregoss Moors to the ancient entrenchment "Castle-an-Dinas"; visiting, by the way, the Castle-an-Dinas Tin Mine, where much interest was manifested in the explanations afforded by Captain Parkin. Here also the party received, and heartily appreciated, welcome hospitalities provided by the Purser, Mr. Whitefield of St. Columb. The fine old British entrenchment, called, by reduplication, Castle-an-Dinas, had to be reached on foot, by a scramble through gorse and heather. It is conspicuously

* Borlase's Antiquities (ed. 1754), Vol. i, p. 364; and Pl. xxxi.

situate on a conical hill, 730 feet in height above sea-level, and about two miles distant, E. by S., from St. Columb Major. It has been described in many of our county histories, and also, with much accuracy of detail, by Mr. MacLauchlan, in the Annual Report of this Institution for the year 1849. It has been suggested, however, that two ramparts, of the four mentioned by Mr. MacLauchlan, are so subordinate to the others as almost to be fairly deemed accidental; the exterior one being caused by throwing the earth dug from the outer ditch, on its forward edge; the middle one by scarping away the hill to get material for the outer rampart. Here Mr. T. Q. Couch read a brief but highly interesting Paper on the recorded history of the Camp, beginning with Carew; and he pointed out how a misinterpretation of the word "Dinas" had led to a belief that the Danes had something to do with it. The Reverend Dr. Bannister gave the unlooked-for information, that the Castle was mentioned in the newly discovered Cornish Miracle Play, dated 1504.

The Church of St. Columb Major was next visited. Here the excursionists were received by the Rector—Rev. H. L. Ventris, and Mr. G. Browne Collins, one of the Churchwardens, who gave much valuable information; the Rev. W. Iago making an explanatory statement, in detail, concerning the restoration of the building. Special attention was called to the fact that the altar was the original altar-stone found in the church by the late rector, Dr. Walker, and by him replaced in its proper position. A Cross in the churchyard, (adorned with trefoil piercing between the limbs and circle, and with three-looped interlaced knots), and a much-defaced Inscribed Stone in a garden adjoining, were next inspected. The Stone bears a Greek Transitional Cross upon its face, and near the lower part the letters "FIL" have been traced; and there are other letters, arranged in lines, down the front of the stone.

After luncheon at the Red Lion Hotel, (where speeches, both practical and complimentary, were made by various gentlemen, including Dr. Jago, Sir Edward Smirke, Dr. Barham, Rev. H. L. Ventris, Rev. W. Iago, Mr. Whitley, and Mr. G. Browne Collins), there was a pleasant drive, through the grounds of Carnanton and the vale of Lanherne, to the recently-restored Church of St. Mawgan, with its fine Arundel Brasses and its interesting Old Carving; and, in the churchyard, an elaborate Gothic Cross, with hexagonal shaft on base, and a four-sided head with cusped and crocketed niches, containing figures. In two of these are mitred personages, each holding a pastoral staff in the right hand. On another side is sculptured God the Father, holding the Crucifixion before Him; and the remaining side contains a group of figures, the decyphering of which appears to have been uncertain, but

Mr. Iago suggested, and Sir Edward Smirke concurred in the suggestion, that they represent the Annunciation. Two other objects in the Churchyard attracted attention—the vault in which the remains of the late Mr. Humphry Willyams, of Carnanton, were recently deposited; and the rude monument which describes how, six-and-twenty years ago, there came ashore at Mawgan a boat containing ten frozen sailors. Above their resting-place is fixed the stern-board of the boat, recording this fact.—At the St. Mawgan Nunnery—formerly the seat of the Pincerna or Lanherne family, and afterwards of the Arundels—the excursionists were courteously received by the resident priest, who conducted them over the garden and chapel. In the garden stands a Saxon Cross, with words (which as yet have never been satisfactorily interpreted) incised within border lines on the front and back; while the shaft is adorned with interlaced network, or braiding of a triple cord. The Chapel contains a fine painting (attributed to Rubens) of the Flagellation of Our Lord; and in an adjoining vestry were seen some magnificent vestments, and the skull of Cuthbert Mayne, a priest, who was quartered at Launceston in the 16th century, and whose head was set on a pole at Wadebridge.

Another drive of several miles, under Mr. W. E. Michell's guidance, and the party arrived at Rialton; one of the paramount manors in Domesday, and given by an Earl of Cornwall to the Prior and Canons of Bodmin. After the Dissolution of Religious Houses, it descended to Mundy, then to Baron Godolphin of Rialton, and afterwards to the Duke of Leeds; but it now forms part of the Duchy of Cornwall. The Manor-House was largely rebuilt by Thomas Vyvyan, the last Prior of Bodmin; and its few remains, including the dungeon, carved shields and inscriptions, &c., existent in a farm-house and mill, were viewed with much interest. Built into a wall of one of the farm buildings is an Inscribed Stone, which has been figured and described by Lysons and C. S. Gilbert; and a good drawing of it, by Miss Annie Shilson, appeared in the Ilam Anastatic Society's volume for 1871. The inscription has been deciphered, subject to correction, as follows:—

BONE MIMOR—
ILL—TRIBVN—

The Rialton remains were described and explained by Rev. W. Iago; after which, the Rev. N. F. Chudleigh, vicar of St. Columb Minor, exhibited the parish church, described by Hals as, "according to its bigness, the finest, best-kept, pewed, or seated, that I know of in Cornwall"; but it now greatly needs restoration. In a roadside field, not very far from the church, stands a

"Cross", shaped like a plain post, but having upon the front and back of its upper portion, a Latin Cross cut in relief.

The day's excursion terminated at Newquay, the thriving little port and watering place which has long outlived the sneer cast upon it by Carew.* Here—in the National School Room—tea was gratefully accepted by the excursionists.

On the second day, the excursionists proceeded from Newquay to Trevelguè Head, for inspection of its now celebrated Barrows, which had been previously explored by Mr. W. Copeland Borlase, F.S.A. The results of his investigations are now recorded in his elaborate work "Nænia Cornubiæ." These two Barrows are situate on the summit of the Cliff; and their more remarkable features are: (1) That their bases are connected on the northern side by a semi-circular bank. (2) That the western one is almost entirely composed of earth burnt as red as brick. (3) That each contains megalithic chambers. (4) That in the eastern one a contracted skeleton was found, together with a beautifully formed stone-hatchet, or axe-hammer, of small size. Mr. Borlase described, with much precision and fulness, the circumstances in which he had made his investigations and discoveries here; and, as an interesting memento of the Society's visit, photographs of the party, grouped in and on the western barrow, were taken by Mr. May, of Plymouth.

Remains of the formidable fortification at Trevelguè Head were next inspected; and an ancient British eating-place, originally discovered by Mr. Nicholls, of Trevelguè, was pointed out. It contains shells, charred matter, and bones; the latter including what Professor Owen has pronounced to be those of *bos longifrons*. Attention was called by Mr. Copeland Borlase to a remarkable flint "chipping-place" at the point of the Island, and many flints were found, of the palæolithic type; Mr. Whitley, however, expressing his opinion that, like others of which he had written, they were not the result of man's handiwork, but the product of natural causes, and had been carried to the place where they were found, by the "northern drift."

After inspection of the Caverns, and especially of "The Cathedral", the party proceeded to St. Cubert, where, in the western side of the church tower is an Early Inscribed Stone.†

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* "The place was called New Quay because in former times the neighbours attempted to supply the defects of nature by art, in making there a quay for shipping, which conceit they still retain, although want of means in themselves or in the plan have left the effect *in nubibus*."

† See *Journal of the Royal Institution of Cornwall*, No. V, p. 55.

The material is very hard and fine-grained, and the Inscription seems to have sustained little injury. It reads off easily: CONETOCI FILI TEGERNO MALI. Dr. Barham gave an explanation of this interesting memorial; and after a visit to the church interior, over which they were conducted by the Vicar, Rev. C. H. Hosken, the party adjourned to the school-room and partook a very acceptable luncheon, for which thanks were due and rendered to Mr. and Mrs. Hosken.

Time failed for the purposed visit to the ancient British church of St. Piran; and so, after luncheon, the excursionists made their way to the workings on the Great Perran Iron Lode, carried on by the Cornwall Mineral Company at Duchy Peru and Treamble. At the latter place the iron-lode is 60 feet wide, and it has a parallel lead-lode of 4 feet width. The iron is worked through an open quarry. Refreshments had been provided at the mine by Mr. Roebuck; and, on a proposal from Mr. Remfry, that gentleman was thanked, through his agent Captain Davis.

Perran Round, probably the best remaining specimen of the open-air theatre, was inspected under the supervision of the Reverend Dr. Bannister, who stated that in it Miracle Plays had been performed, and that the common name of such a place was, in Cornish, *Plain-an-Gwarry*.

West Chiverton Lead Mine was next visited, and details of its operations were given by Captain Juleff and other agents. There are now at work on the mine 2 80-in. cylinder pumping engines; 3 24-in. drawing engines, 2 crushers attached; 2 steam capstans; 1 steam hammer; 1 steam saw mill; 1 30-in. cylinder stamping engine, driving 32 heads of stamps; 3 water wheels driving the dressing machinery; 1 water wheel working bellows in smithery; 3 Borlase's buddles, also a large quantity of other kinds of buddles; 11 Hunt's jigging machines. The mine is sunk to the 140-fathom level below the adit. There are 366 men employed underground; and 276 men, boys, and girls on the dressing floors, and other surface work. The pitwork is 17 inches in diameter, and about 3,000 tons of water in 24 hours are being pumped out, to keep the bottom of the mine free for working. It takes about 4,000 tons of water per day to wash the ore. The mine has returned 35,592 tons of ore, which realized £473,820, and paid dues to the lords £31,578. 12s. 4d., gave profits to the adventurers £152,625, and laid out in machinery, &c., £50,000. By kind permission from the Agents, Dinner was served in the Account House; and, after thanks had been voted to all who had in any way contributed to the success of the Excursion, vehicles were for the last time called into requisition, and the party returned to Truro, safely and in good time.

FIFTY-FOURTH ANNUAL GENERAL MEETING

OF THE

ROYAL INSTITUTION OF CORNWALL,

Held on Tuesday, November 19th, 1872.

This Meeting was held in the Institution Lecture-Room, and there were present: Mr. John St. Aubyn, M.P., the President; Mr. A. Pendarves Vivian, M.P.; Dr. Barham, Rev. Dr. Bannister, Mr. W. Copeland Borlase, F.S.A., Rev. H. Borrow, Mr. F. V. Budge, Rev. J. R. Cornish, Mr. Criddle, Mr. W. J. Henwood, F.R.S., Rev. E. Houchen, Mr. S. Hocking, C.E., Dr. Jago, F.R.S., Rev. W. Iago, Mr. Kitto, Mr. H. Spry Leverton, Commander Liddell, R.N., Mr. S. Pascoe, Mr. Alexander Paull, Rev. H. S. Slight, Mr. Tyerman, and Mr. Worth.

THE COUNCIL'S REPORT.

The Council are glad to be able to congratulate the members of the Institution on the interest which has been exhibited in its work during the past year, as shewn by the number of new members who have been elected, and by the papers contributed to its Journal.

The Treasurer's statement of accounts shews that £147. 9s. 6d., has been received in subscriptions during the past year, and that the present balance in hand is £77. 12s. 2d.; that of the commencement of the year having been £36. 7s. 9d. The mortgage debt is now £150.

The Rooms in the Museum formerly occupied by the Cornwall County Library, which were fitted up last year for the use of members of the Institution, have been found exceedingly useful for meetings and for the reception of books and periodicals. They are open to members during the day; and on Mondays, in the evening also, until 10 o'clock.

The additions to the Museum have not been large, but some progress has been made in arrangement, especially in regard to the coins. The Council having been advised that the condition of

the stuffed birds was unsatisfactory, a report on the subject has been obtained from Mr. Vingoe, of Penzance, who writes: "some "of them are in a very bad state and must be withdrawn from "the Museum; all the cases require close fastening to exclude "moths." He recommends that the work should be undertaken early next spring, and your Council consider that course advisable.

A draft of a Bill for the Preservation of National Monuments having been forwarded to the Institution by its author, Sir John Lubbock, its provisions have been carefully discussed at meetings of the Council, and a report on some of the practical difficulties which its execution would involve has been transmitted to him through the President, whilst the object sought to be obtained by the Bill was most strongly advocated.

The number of the Journal issued in April last is perhaps the most valuable which the Institution has yet produced; its value being greatly due to the admirable address from the late President, Mr. Henwood, the practical importance of which has been so justly estimated that a considerable part of it has been translated into French by direction of *la Commission des Annales des Mines*. By the permission of your Council, a portion of it has been separately printed for the use of Students in the classes of the Miners' Association of Devon and Cornwall. It is to be regretted that, notwithstanding the liberality of Mr. Henwood, who bore the whole cost of printing his Address, the expense of this number has weighed heavily on the income of the Institution. Your Council have devoted much attention to the consideration of arrangements by which these charges might be reduced, and their enquiries will still anxiously be directed to that end. It is clear that it is mainly through the printing of communications that the interest of those who work for us, as well as that of our more distant members, can be maintained; and although the condensation of some papers may be imperative, you will agree with us in the desire to encourage their production. It has been decided that in future the price of a number of the Journal to non-subscribers shall be four shillings.

Copies of back numbers of the Journal have been sent to the Honorary Secretary of the Society for sending out books to replace those destroyed by the late fire at Chicago.

The Annual Excursion held on August 19th and 20th was most successful, and a great deal of practical information was given at the various halting places by gentlemen who were thoroughly familiar with their subjects. Owing, however, to various causes, it was found that the prices charged for the tickets had not been sufficiently high to cover the expenses, and an adverse balance has been accordingly thrown on the funds of the Institution. The

thanks of the Institution are especially due to Mr. Whitefield, of S. Columb, for his hospitality at Castle-an-Dinas Mine, to Mr. W. E. Michell, of Newquay, and the Ladies who so ably assisted him there; to the Rev. C. Hosken and Mrs. Hosken, and to Mr. W. R. Roebuck, for their kindness at Cubert and at the New Iron Mines respectively, to Mr. R. Clogg and Capt. Juleff, the representatives of the West Chiverton Adventurers, for their most comfortable arrangements at the mine; and to Sir Thomas Acland, Bart., M.P., for the great kindness with which he undertook to make arrangements for the Institution to visit Trerice during their Excursion, should they be able to do so.

The Conversazione which was held after the Annual Meeting of last year was very well attended, and afforded an excellent opportunity for the fuller description of some of the objects of interest connected with the Excursion of 1871.

The Meteorological Observations, which were commenced in 1838 and have been continued uninterruptedly since that date, have been made as usual, and have been communicated to Greenwich and elsewhere by the Curator of the Museum.

The numbers of visitors who have been admitted to the Museum during the year are:—admitted free, 6,044; by ticket, 148; by payment, 99. Total, 6,291.

Twelve new subscribing members have been elected, including the Earl of Mount Edgcumbe, Sir John Salusbury Trelawny, Bart., M.P., Colonel Hogg, M.P., and Mr. G. F. Basset, of Tehidy. The Council have, however, to record with deep regret the deaths of three members, who had for many years taken great interest in the work of the Institution—Mr. Augustus Smith, at one time President of the Institution, Mr. Humphry Willyams, of Carnanton, and Mr. Enys, of Enys, one of the Trustees.

In conclusion, the Council wish to express a strong hope that some means may soon be found of utilizing the admirable lecture-room and laboratory of the Institution, which have been for some time quite unused. Looking back upon the great advantage which some of the more intelligent young men of the town and neighbourhood derived from science classes held in it in former years, the Council are most anxious that the question of resuming them should be discussed. The great difficulty lies in the provision of qualified Teachers, but though no practical step has been yet taken in the matter, your Council would be glad to think that there was a prospect of some united action being agreed on by the three great County Societies and the Miners' Association. The aid given to such Teachers by the Government might be looked to as removing all serious financial difficulty in the way of providing sufficient remuneration for well qualified lecturers, who

could conduct classes in several towns in succession and utilize our collections for purposes of instruction.

You will join us in regretting that the Rev. J. R. Cornish has resigned the office of a Secretary, and Mr. Michell Whitley of an Assistant Secretary, in which they have rendered most valuable service to the Institution. The Council have great pleasure in reporting that Mr. F. V. Budge has accepted the post of an Assistant Secretary.

The Council's Report having been read by Rev. J. R. Cornish, it was resolved unanimously, that it be received, adopted, and printed.

The following Resolutions were passed unanimously :—

That the thanks of the Society be given to the Officers and Council for their services during the past year; and that the following gentlemen form the Council for the ensuing year :—

President, Mr. JOHN St. AUBYN, M.P.

Vice-Presidents.

Mr. H. S. Tremenheere, F.G.S.,
James Jago, M.D., Oxon., F.R.S.,
Lieut.-Col. Tremayne,
Mr. A. Pendarves Vivian, M.P.,
Mr. Jonathan Rashleigh.

Mr. Tweedy, *Treasurer.*

Mr. Whitley, *Secretary.*

Assistant Secretaries, Mr. W. G. Dix, and Mr. F. V. Budge.

Other Members.

Rev. J. Bannister, LL.D.,
C. Barham, M.D., Cantab.,
Mr. W. Copeland Borlase, F.S.A.,
Rev. J. R. Cornish,
Rev. W. Iago,
Mr. A. Paull,
Mr. W. J. Rawlings,
Mr. H. O. Remfry,
Mr. E. Sharp, Jun.,
Mr. W. Tweedy,
and The Mayor of Truro.

Local Secretaries. { *Bodmin*, Mr. T. Q. Couch, F.S.A.,
Truro, Mr. Alexander Paull.
London, Mr. Michell Whitley.

That the cordial thanks of this Meeting be given to those gentlemen who have favoured the Institution with Papers or other Communications in the course of the year, and also to the Donors to the Library and Museum.

Mr. Budge read the Lists of Presents :—

DONATIONS TO THE MUSEUM.

Portrait of Professor Hunt	Mr. Henwood, F.R.S., &c.
Waif of the Atlantic Ocean,* brought from the Tropics by the Gulf Stream, and stranded at Gunwalloe	Mr. Rogers, Penrose.
White Spathose Iron Ore, from Treamble Mine Ditto (calcined). White Spathose Iron Ore, from Duchy Peru. Ditto (calcined). Brown Hæmatite Iron Ore, from Higher Treamble Mine Brown Hæmatite Iron Ore, from Lower Treamble Mine Silver-Lead Ore, from Lower Treamble Mine	Mr. Roebuck, Trevarthian.
Malachite from Burra Burra Copper Pyrites from Moonta Massive (Tile Ore) and Crystallized Oxide of Copper (three specimens) from Wallaroo Schorl, from Wallaroo Green Carbonate of Copper, Wallaroo Molybdenite, from Wallaroo Crystallized Copper Pyrites Chloride of Copper (three specimens)	Mr. Samuel Higgs, jun., F.G.S., F.A.S., of Wallaroo, near Adelaide, South Australia.
Chromate of Lead, from Congonhas do Campo, Brazil	Mr. Thomas Treloar, Helston.
Miners' Tools, A.D. 1798 A Dag (axe) broken A Pick-head A Hammer and Handle. Found August, 1872, at bottom of old workings, in Huel-Oak Tin Mine, Ludgvan; left there when abandoned in Feb., 1798	From Mr. W. P. Cardozo, Purser; through Mr. Rogers, Penrose.
Rubbing from the east face of Font, Crantock Church	Mr. E. H. W. Dunkin.
Shells (Two Pairs) from India Three Shells, *Pteroceras Scorpius*, do.	From Mr. W. P: Cocks, Falmouth.
Egg of Crocodile, from Jamaica	Mr. Banks, Falmouth.
Two Silver Coins†	Rev. C. T. Comber, Truro.

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* A leaf-branch of Palm.

† A Penny, Hen. II, (York mint; Moneyer, Turril [?]); and Groat, Hen. VIII; found among the ruins of Thornton Abbey, Lincolnshire.

ADDITIONS TO THE LIBRARY.

Parochial and Family History of the Deanery of Trigg Minor. Part V, 1872. (St. Endellion). By Sir John Maclean, F.S.A., Member of the Royal Archæological Institute of Great Britain and Ireland, Honorary Member of the Royal Institution of Cornwall, etc.	Presented by Mr. Henwood, F.R.S., &c.
The Church Bells of Devon: with a List of those in Cornwall; to which is added A Supplement of various matters relating to the "Bells of the Church." By the Rev. H. T. Ellacombe, M.A., F.S.A., of Oriel College, Oxford; Rector of Clyst St. George, and Domestic Chaplain to the Earl of Harrington, 1872.....	Ditto.
The London, Edinburgh, and Dublin Philosophical Magazine, and Journal of Science. Fourth Series. From No. 288, June, 1872, to No. 294, November, 1872, (with Supplement for July).	Ditto.
Mineral Statistics of Victoria, for the year 1871.	Ditto.
Reports of the Mining Surveyors and Registrars (Victoria). For Quarter ending 30th June, 1871. ditto, 30th September, 1871. ditto, 31st December, 1871. ditto, 31st March, 1872.	Ditto.
1872. Victoria. Coalfields, Western Port. Report.	Ditto.
The Miners' Association of Cornwall and Devonshire. Observations on the Metalliferous Deposits of Cornwall. By William Jory Henwood, F.R.S., F.G.S., President of the Royal Institution of Cornwall. Reprinted, with alterations and additions, from the *Journal of the Royal Institution of Cornwall.* No. XIII.	From the Author.
Notes and Extracts from various Authors, collected in the course of my reading, from the year 1853, chiefly on Subjects of Natural History, and bearing on the Ancient Condition of that Science. Jonathan Couch, Polperro, *(Manuscript)*	From Mr. T. Q. Couch, F.S.A.
Visions of the Western Railways. Dedicated to Sir Charles Lemon, Bart., M.P. for the Western Division of Cornwall. (Printed for Private Circulation), 1838	Ditto.

A Handful after Harvest-Man: or, A Loving Salutation to Sion's Mourners, being a Collection of several Epistles and Testimonies of that Faithful Labourer in the Lord's Vineyard, Richard Samble. Together with several Testimonies of Friends, that were Witnesses of his Labour in the Gospel in his latter days.* ..... From Mr. T. Q. Couch, F.S.A.

The Honeymoon. By John Fisher, A.M., 1840. ..... Ditto.

A First Book of Mining and Quarrying, with the Sciences connected therewith, for use in Primary Schools and Self-Instruction. By J. H. Collins, F.G.S., Lecturer to the Miners' Association of Cornwall and Devon; author of "A Handbook to the Mineralogy of Cornwall and Devon," etc., etc..... From the Author.

A Cornish Fauna; being a Compendium of the Natural History of the County. Part I. containing the Vertebrate, Crustacean, and a portion of the Radiate Animals. By Jonathan Couch, F.L.S., &c., 1838. ..... From Mr. W. J. Hughan.

Royal Geological Society of Cornwall. The 56th, 57th, and 58th Annual Reports of the Council, with the President's Address, Treasurer's and Librarian's Reports, &c., &c. From the Society.

Report and Transactions of the Devonshire Association for the Advancement of Science, Literature, and Art. [Exeter, July, 1872.] Vol. V.—Part I ..... From the Association.

Proceedings at the Annual Meeting of the Archæological Institute of Great Britain and Ireland, at Winchester, September, 1845..... From the Institute.

Memoirs illustrative of the History and Antiquities of the County and City of York, communicated to the Annual Meeting of the Archæological Institute of Great Britain and Ireland, held at York, July, 1846; with a General Report of the Proceedings of the Meeting, and Catalogue of the Museum formed on that occasion .... Ditto.

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* Mr. T. Q. Couch notes that Richard Samble was one of the early Cornish Members of the Society of Friends. Born at Penhall, in St. Enoder, 1644; died, 1680, at Clampit, near Mourton, in Devonshire.

Memoirs illustrative of the History and Antiquities of Norfolk and the City of Norwich, communicated to the Annual Meeting of the Archæological Institute of Great Britain and Ireland, held at Norwich, July, 1847, with a General Report of the Proceedings of the Meeting, and a Catalogue of the Museum formed on that occasion	From the Institute.
Memoirs illustrative of the History and Antiquities of the County and City of Lincoln, communicated to the Annual Meeting of the Archæological Institute of Great Britain and Ireland, held at Lincoln, July, 1848, with a General Report of the Proceedings of the Meeting and a Catalogue of the Museum formed on that occasion	Ditto.
The Journal of the Royal Historical and Archæological Association of Ireland. Vol. II.—Fourth Series. April, 1872. No. 10..	From the Association.
Annual Report of the Board of Regents of the Smithsonian Institution, for the year 1870.....	From the Smithsonian Institution.
The Journal of the Anthropological Institute of Great Britain and Ireland. No. IV. Vol. II. No. I, April, 1872. No. V. Vol. II. No. II, July and October, 1872.....	From the Institute.
List of the Members of the Anthropological Institute of Great Britain and Ireland. Corrected to March, 1872	Ditto.
Proceedings of the Scientific Meetings of the Zoological Society of London, for the year 1871. Part II, March—June Ditto Part III, November, December..... Ditto, for the year 1872. Part I. January—March	Ditto.
Revised List of the Vertebrated Animals now or lately living in the Gardens of the Zoological Society of London, 1872	Ditto.
Catalogue of the Library of the Zoological Society of London, 1872, (including Catalogues, &c., of the British and other Museums, and Journals and Transactions of Learned Societies)	Ditto.
Collections of the Surrey Archæological Society. Vol. VI. Part I. 1872	From the Society.

Proceedings of the Geological and Polytechnic Society of the West Riding of Yorkshire.—New Series, Part I. 1871—2	From the Society.
The Fifty-Second Report of the Council of the Leeds Philosophical and Literary Society at the close of the Session, 1871—72. Read at the Annual Meeting, May 7th, 1872.	Ditto.
Transactions of the Edinburgh Geological Society. Vol. II.—Part I. Sessions 1869—70, 1870—71, 1871—72	Ditto.
Proceedings of the Philosophical Society of Glasgow. Vol. VIII.—No. I, 1871—72....	Ditto.
Journal of the Liverpool Polytechnic Society, September 28, 1872.	
Ditto October 26, 1872	Ditto.
Proceedings of the Liverpool Naturalists' Field Club, for the year 1871—72	From the Club.

Dr. BARHAM read the following letter from Mr. Rogers of Penrose, accompanying his loan, for exhibition at this meeting, of a Hammer-head, of Greenstone, found in the parish of Cury :—

Penrose, Aug., 1872.

Dear Dr. Barham,

I send for your next Meeting of the Royal Institution of Cornwall, an unfinished hammer-head of greenstone, weight 1 lb. 12¾ ozs. avoirdupois, found last year on my estate of Burnow in Cury parish, a foot under surface, in a furze croft which was being broken for tillage.

There is a small ancient earthwork near the centre of the estate, 0a. 1r. 23p. in size; and the farm of Penvores, where the two-looped palstave* was found also last year, is not far off.

The hammer-head is thus noticed by my friend Mr. Augustus W. Franks, keeper of antiquities in the British Museum:

"Your stone hammer-head is rare for England. We generally consider "such specimens as unfinished pierced axe-heads. Whether rightly or not, "I am not certain. I have a very similar specimen here (Christy Collection) "from Denmark."

The Burnow specimen is precisely similar in form to a perfectly perforated specimen in the British Museum, found in the Thames, but apparently of rather more compact stone than this. It also has the same abrasion of one surface.

See Photograph No. 16 of Pre-historic series of British Museum Photographs. 1872.

Yours sincerely,

JOHN J. ROGERS.

* See 54*th Report* (1872) *of the Royal Institution of Cornwall*, p. xciii.

Among the observations made in the course of proceedings, were the following:

Mr. PENDARVES VIVIAN, M.P., on moving the adoption of the Council's Report (in which he was seconded by Mr. H. SPRY LEVERTON), said it was a matter of great satisfaction to him to have heard so good an account of the condition and operations of the Institution; because he looked on the existence of such associations throughout the country as of immense service in disseminating that theoretical scientific knowledge which might hereafter, in many minds, bear practical fruit. It was not necessary that he should remind his hearers what vast strides in science were being made in present times—strides so immense that if they could imagine a chemist who had ceased to advance twenty years ago, coming face to face with their present knowledge, he would be seen to be utterly out of the race. And in every branch of science similar advances had been made. To himself few things were more surprising than the progress which had been made in Hydraulics, which had lately done more for the country than any other science, because it had been extensively applied practically: the lifting of tons' weight by means of a few drops of oil was now an every-day practice. Then again there was the extension of Telegraphy. It must be matter of pride to every member of a scientific institution to think of what had been accomplished by the telegraph within the last few days. It had bridged over time and space, and brought England into close communication with the antipodes and with one of her most important colonies. This was but the extension of a system already existing throughout the civilized world; but its occurrence had brought into prominent notice the immense value of science in first bringing out an invention which had induced such a result. He hoped that the extension of the telegraph to Australia might be held to typify the close connection between that colony and the mother country—a connection which he fervently desired might never be interfered with.—As an instance of the beneficial results of chemical science practically applied, Mr. Vivian mentioned that the Firm to which he belonged had introduced a process, invented by a German, which enabled them, in dealing with yellow ores, to prevent the escape of sulphurous vapours and to collect the sulphuric acid in leaden chambers, whence it was conveyed into tanks, and made available in the manufacture of artificial manure. Previously the escape of the gases had made barren the surface of the earth, but as treated now they were made to increase its productiveness.

On the hint given in the Council's Report as to the present condition of the Ornithological Department of the Museum, Mr.

H. Spry Leverton said he had himself observed that the birds were getting into very bad condition; and, as some years since he devoted much attention to Ornithology, and to the art of bird-stuffing, he should be happy, in the spring, to render assistance to any person who might undertake the task of putting the birds in order.—Mr. Leverton's offer was received with manifest thankfulness; and Dr. Barham remarked that the Institution had always been desirous of obtaining assistance from individual members, in the improvement of any particular portion of the Museum; and be instanced as valuable, the assistance given by Mr. Williams Hockin in the department of Conchology, and by Mr. W. G. Dix in that of Coins.—The President regretted the unfortunate condition of some of the stuffed birds in the Museum; and he hoped the state of the cases would be looked to in future. It was evident that persons making presents to the Museum had a right to expect that their presents should be taken care of. All persons keeping stuffed birds well knew that they required to be examined frequently.

In regard to the *Journal* of the Institution, Dr. Barham said he looked on it as a most valuable means of promoting the Society's objects; but its printing was expensive, and its sale limited, and therefore it had been found necessary to increase its charge from 3s. to Four Shillings. But he wished further to make a suggestion, the adoption of which, he hoped, would not greatly increase the cost of publication, while it would augment the interest and value of the *Reports*. At present each publication included the *Report* and the *Journal* proper; and his suggestion was, simply, to divide the work into two sections—one, containing the Report of the Autumnal Meeting, with the Periodical Tables, to be brought out soon after the beginning of the following year; and the other section to be published as soon as possible after the Spring Meeting. And it occurred to him that this plan would involve no increase of expense beyond that of the additional Covers, and Postages.

Also on the subject of publication, Mr. Budge (an Assistant Secretary) in moving thanks to the contributors of Papers and the Donors to the Museum, said it could not be too widely known that this Society was always ready to receive Papers on scientific and other subjects connected with the county. It might not be possible or desirable to print *in extenso* all Papers received; but the Contributors would be consulted with reference to any modifications deemed necessary.

Dr. Barham next spoke on the propriety of increasing the educational powers of this Institution, and on means for effecting this

object, probably by combined action with the other great Societies in the County. He observed that since the time when the successive attempts to establish Mining Schools in Cornwall had been tried and abandoned for lack of funds, there had been established the system of employing Certificated Teachers under the Science and Art Department, with payment according to results of their teaching; and he would suggest that at certain Centres—say, Falmouth, Penzance, and Truro—there should be stationed such Teachers,—thoroughly competent men, who should itinerate weekly from place to place, each giving instruction in the science with which he was especially conversant. At Penzance, for instance, might be resident a Teacher in Geology and Mineralogy; at Truro, in connection with this Institution and its laboratory, a Teacher in Chemistry; and at Falmouth, a Teacher in Mechanics and other sciences more immediately associated with the Polytechnic Society. At each of these places there would thus be provided three lectures weekly, furnishing altogether a tolerably complete course of scientific instruction in all these districts; and the Teachers would make themselves acquainted with the collections and apparatus now lying idle in each town, and render them practically useful to their classes. The work of the Miners' Association might at the same time be helped forward. It appeared to him that, with the existing arrangements under the Science and Art Department, and with the earnest desire now felt generally for extended education in science, the Societies in this County might, by combination, do something really effectual at moderate cost. If the full scheme which he had shadowed forth could not be at once carried into effect, there could be nothing to prevent their obtaining one good Teacher, who, in addition to other means of income, might get some £30 to £40 a year from each of the proposed Centres. If a competent man could not be obtained in the County, there would be no difficulty in procuring one from the Science and Art Department.

Mr. St. Aubyn expressed entire concurrence in the observations on the subject of Education which had been made in the Report, and spoken on by Dr. Barham; and he the more readily inclined to such concurrence because of the co-operation invited from other Societies. His views in favour of such amalgamation had not been very popular, either at Penzance, Falmouth, or Truro; but probably they were not the less sound on that account. He was satisfied that, by a union of the scientific societies in Cornwall, they would, without impairing their local efficiency, obtain means for effecting a greater amount of good and of still more widely distributing information on scientific matters. He

should like to see them amalgamated in one great society which should affiliate, but not destroy, all the other societies, and thus bring all their operations into one focus. In this way they would greatly economize their resources and increase their results.

Rev. H. S. SLIGHT spoke of a recent invention, said to be both remarkable and valuable, by which the rolling of a vessel at sea was to be made available for pumping out bilge water, and also probably as a means of making fog signals.—Captain LIDDELL said that to him, as an old sailor, the subject was of great interest. It would be indeed a very great benefit if the offensive bilge-water could thus be got rid of, and if by the same means a fog-trumpet could be sounded. Of course, the invention would be of no use unless the vessel was in motion ; but then there was always some slight motion at sea, and this could at any time be made available by putting the ship "broadside on."

At the close of the meeting, thanks were unanimously voted to Mr. St. Aubyn for the ability with which he had presided over the proceedings.—In moving the resolution to this effect, Dr. BARHAM spoke of thanks especially due to Mr. St. Aubyn for his attendance on this occasion, in consequence of anxious duties which had claimed his attention at Plymouth. At all times they were indebted to gentlemen in Mr. St. Aubyn's position for attendance at these meetings, knowing how numerous were their more important engagements. They were also glad to have among them a representative of the old and honoured House of St. Aubyn.—Mr. W. C. BORLASE, seconding the motion, after remarking that Mr. St. Aubyn lived where it was impossible for anyone to live without becoming an antiquary, quoted a sentence written a hundred years ago by his great-great-grandfather (Dr. Borlase)—that St. Michael's Mount was happy in its situation, and still happier in its owner. That was true then, and equally true now.

Dr. JAGO, in putting the motion, expressed his concurrence with previous speakers in a feeling of regret at losing the services of their excellent Secretary, Mr. Cornish. The duties of that office required great skill and attention, and Mr. Cornish had performed them most effectively.—Dr. Jago also expressed his gratification that the Institution was now in a more thriving condition that it had ever been.

A Conversazione was held in the evening in the new Lecture Room. In the unavoidable absence of the President, Mr. J. St. Aubyn, M.P., his parliamentary colleague, Mr. A. Pendarves

Vivian, presided during the early part of the evening, and on his being obliged to leave for Wales, the chair was filled by Dr. Barham.

The main purpose of the meeting being a retrospect of the Autumn Excursion, special duties were assigned in three different departments; Mr. W. Copeland Borlase giving an address on the Præhistoric Antiquities at Trevelguè Cliff-Castle and Barrows; Rev. W. Iago on more recent Antiquities, and especially Inscribed Stones; and Dr. Barham on the Mining incidents of the Excursion.

Mr. BORLASE shewed what a strong fortress the early inhabitants of Cornwall had made of Trevelguè Island, and with what skill it had been defended by ditch and rampart; and he explained most lucidly the character and importance of the interments in the barrows.* Referring to the various objects discovered within them, he spoke much concerning the considerable number of fractured flints; and thence adverting to the abundance of flints in the neighbourhood, he suggested two questions for consideration: 1st, How came there flints in Cornwall? 2nd, Flints being here, what was the cause of their being fractured?—It was impossible, he said, that man could either have brought them all hither, or have broken them all; though what Nature had brought and wrought, Man could utilize by application to his own purposes. Mr. Borlase fully accepted the opinion held by Mr. Etheridge that cretaceous beds once extended over the whole of what is now the West of England, and that the flints found here are relics of those beds, made bare by denudation of the chalk.

Dr. BARHAM stated that he had himself collected at Scilly numerous flints, unbroken, and in nodules of chalk; there were also broken flints in large number on the surface soil; but it was a very important fact, that there were plenty in unbroken nodules beneath the existing soil.

MR. BORLASE, in confirmation of the opinion that flints found in Cornwall were a natural formation, though not in connection with any existing cretaceous beds, observed that, in Devon, flints were found similarly deposited on the *greensand*, as they were on various geological formations in Cornwall. Flint Finds, similar to those of which he had spoken, existed in other parts of North Cornwall, and also at Trelan, in the Lizard district.

MR. HUDSON suggested that some help in solving the question might be derived from the researches of Dr. Bowerbank. He had shown that flints were the produce of decayed sponges;

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* See Mr. Borlase's industriously compiled and carefully written work, recently published, entitled: "*Nænia Cornubiæ, a Descriptive Essay, illustrative of the Sepulchres and Funereal Customs of the Early Inhabitants of the County of Cornwall.*"

and sponges, the fabric of which was almost wholly made up of siliceous spicula, were met with in all parts of the world and in every geological formation.

Mr. BORLASE observed that matter similar to the chalk was now found at the bottom of the Atlantic, formed of aggregations of animal life which resembled closely those found in our chalk rocks and strata. The flints constituted a small section of the chalk formation. They belonged to the upper chalk.

In reply to an enquiry from the chair to what extent the interments in Denmark threw light on the date and country of those found at Trevelguè, Mr. BORLASE stated that although similar interments were found in those northern countries, they were likewise met with in various parts in which there was no reason to suspect incursions of those sea freebooters; and they were therefore assigned by the best authorities to very early inhabitants of this island.

Rev. W. IAGO stated that the first Inscribed Stone he had to notice in connection with the Excursion, was one, hitherto unknown, to which his attention was called by Mr. T. Q. Couch and the Rev. H. Borrow. It was in Lanivet village, and was built into the wall of a house. The portion of inscription remaining (of which Mr. Iago exhibited a rubbing) contained the letters—NNICVS; the age was of the transitional period from Late Roman to Early Saxon. He had since found the commencing letter on an adjacent fragment. The name is "Annicus." Mr. Iago next exhibited a rubbing of the inscription recorded by Dr. Borlase as, in his time, apparently "Ruani hic jacit," on a stone near the "Indian Queen." Next followed a rubbing of, and observations upon, the inscription on the sculptured Cross in the garden at Lanherne Nunnery. The sculptures represented the Crucifixion and bosses for the Passion; but the Inscription was as yet undeciphered, though rubbings had been submitted to many of the highest antiquarian authorities in the kingdom, whose very different readings gave much amusement. A portion of it Mr. Iago read as BLEID—seemingly significant of the British name *Bleidd*=Wolf (Lupus); and it might be remarked that "Bleidud" was one of the names given in the Bodmin List of Manumitted Serfs. (Dr. Barham mentioned the still earlier British name of *Bladud*—who was legendarily reported to have discovered the medicinal virtues of Bath waters).—Mr. Iago next noticed the Inscribed Stone at Rialton, which he described as Romano-British; and he suggested that possibly the letter F had been broken away before the ILL commencing the second line.—The "Conetoci" Stone at Cubert was next noticed; Dr. Barham speaking of its similarity in character to an inscribed stone in

Tregony Church deciphered about the same time.*—Various other objects were spoken on by Mr. Iago, as having been especially attractive during the Excursion—as at St. Columb, Mawgan, Rialton, Perran Round, &c.; and, in relation to Lanherne, the reverend gentleman exhibited an Ancient Rent Roll, of Sir John Arundel, *temp.* Hen. VIII.; Lanheron was mentioned, and the Roll included a year's account of Sir John's income from Tin produce.

The proceedings closed with a brief survey by Dr. BARHAM of the mining experiences of the Excursionists,—at the Castle-an-Dinas Tin Mine, and at the Consolidated Iron Mines. He hoped that these works would enrich their promoters, and be a means of affording to the public increased facilities for visiting the North Coast. The vein of iron, which was about 30 feet wide, had been traced for about 10 miles E.S.E.; and parallel with it, was a fine lode of lead. Large specimens of both ores, presented to the Institution by Mr. Roebuck, lay on the table.

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* See *Journal of the Royal Institution of Cornwall*, No. V.

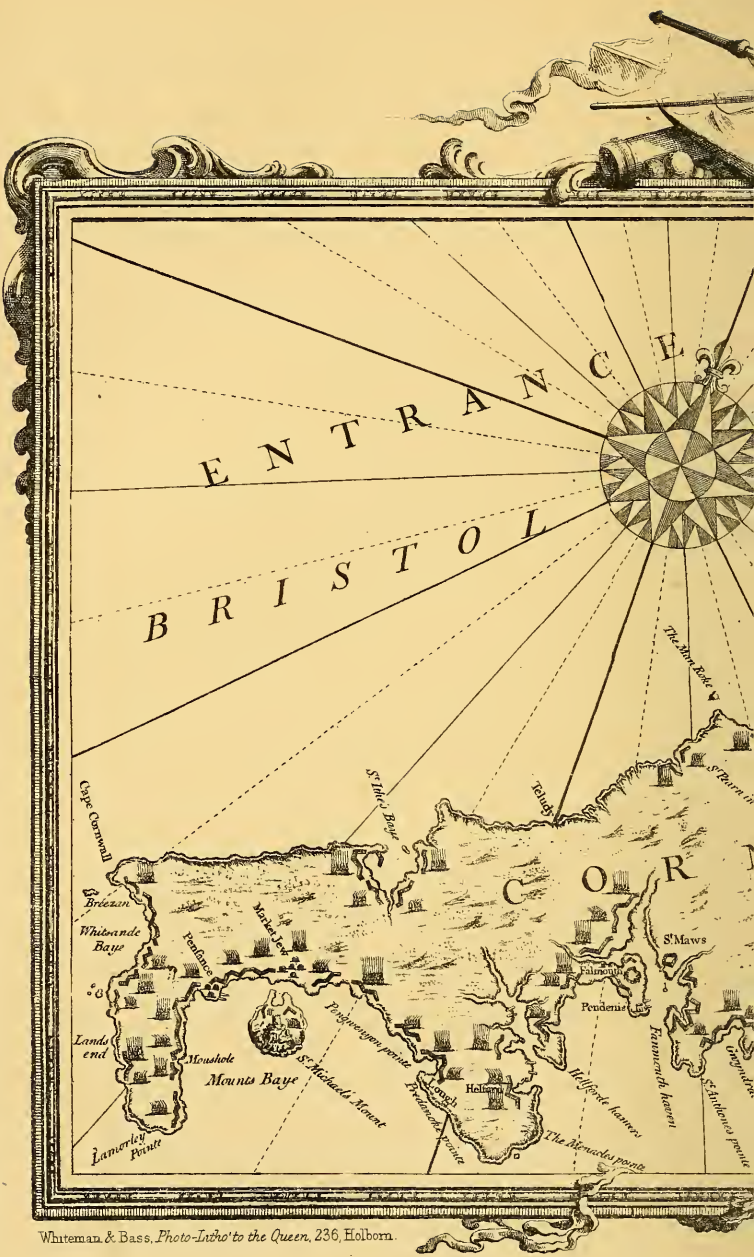
Dr. Robert Tweedy in account with the Royal Institution of Cornwall. Cr.

1872.		£	s.	d.
July 31.	To Balance from last Account	36	7	9
	Annual Subscriptions.....	107	9	6
	Ditto H.R.H. the Prince of Wales	20	0	0
	Ditto Truro Town Council.....	20	0	0
	Visitors' Fees	2	9	6
	Sale of Journals.....	20	8	0
	Sale of Reports	2	10	0
	Illustration Fund	8	8	0
	Excursion, 1871	14	6	9
		£231	19	6
1872.	Balance	£77	12	2

ROBERT TWEEDY, Treasurer.

1872.		£	s.	d.
July 31.	By Taxes and Fire Insurance	6	19	0
	Repairs.....	19	19	3
	Curator's Salary	44	0	0
	Museum Expenses	8	18	2
	Printing and Stationery.....	5	13	3
	Postages and Carriage of Parcels..	8	3	1
	Editing Journal and Report*	15	5	7
	Illustrations for Report	12	4	6
	Sundries	1	2	4
	Ray Society	1	1	0
	Palæontographical Society, 2 years	2	2	0
	British Meteorological Society	1	0	0
	Royal Horticultural Society	2	2	0
	Quarterly Journal of Science	0	10	0
	"The Garden" Newspaper	0	19	0
	Interest on Mortgage Debt	5	15	5
	Binding Books.....	4	7	0
	Additions to Museum.....	4	18	6
	Expenses of Conversazione	1	5	6
	Loss on Excursion, 1872	8	1	9
	Balance.....	77	12	2
		£231	19	6

* Printing Journal not paid..... £58 19 6



Whiteman & Bass, *Photo-Litho to the Queen*, 236, Holborn.

JOURNAL

OF THE

ROYAL INSTITUTION OF CORNWALL.

No. XIV. **APRIL.** **1873.**

I.—*State of the Ports in Cornwall*, 5 *Aug.*, 1593—1595.—From Mr. Henry Lee Rowett, Polperro.

Presented at the Spring Meeting, May 17, 1870.

THE following letter, in the Cottonian Collection of Manuscripts, saved from the fire at Ashburnham House, October 23, 1731, and now in the British Museum, *(Cottonian MSS., Otho E*, XI., *fol.* 230*)*, shows the state of the ports in Cornwall in 1593—5.

The portions burnt have been supplied by a careful study of the context.*

The "Barycades" alluded to, were, doubtless, hastily constructed fortifications on the coast.

A Map of the coasts of Devonshire and Cornwall, without date, but evidently made at the same time, and now in the British Museum, *(Cottonian MSS., Aug: 1: Vol. I: 6)*, represents this plan of fortifications; of which, Sir Thomas Baskerville says: "the placis where to sett those Barycades I have shewid them." It is labelled: "A plott of all the Coast of Cornwall and Devonshire, as they were to be fortyfied in 1588, against the landing of any Enemy"; very neatly drawn on vellum, on two sheets, measuring together 5 ft. 2 in. × 2 ft. *(Cott: Aug.* I. i. 6). This has been engraved by Pine, and was published with his plates of the tapestry hangings of the House of Lords, which represented the defeat of the Spanish Armada.—See also the "Report on the

* In the following printed copy, they are indicated by *Italics.*


ENTRANCE into
CHANNEL
BRISTOL
DEVON
SHIRE
CORNWALL
THE BRITISE CHANNEL
A Plott of all the Coast of
RNWALL and DEVONSHIRE,
hey were to be fortified in 1588
nst the Landing of any Enemy
ken from the Original in the Cottonian Library
Lundy Ile
Hartlands point
Marcklow
Bolt Tayle
Prawle point
Start Bay
Mounts Bayne
Whitsande Bayne
Lizard
Lands end
St Maws
Fowey
Mulbrooke
Plymouth
Dartmouth
Berry point
Whitaker & Bax Photo-Litho to the Queen 236 Holborn

arrangements which were made for the internal defence of these kingdoms, when Spain by its Armada projected the invasion and conquest of England"; privately printed in 1798, by the late John Bruce, Esq., of the State Paper Office.

To the

Most honorable *the Lords of her maties*

Most Honorable pryvy Counsell.

May itt pleas your Lordshippe to be advertised *that accord*ing to your comandement I have bin in Cor*nwall and* have vewid all the porte towns and crikes, bothe *on the south* and northe sea, and would have senn the so*uthern* cuntry perticulerly in their divisions, w^t^outt dr*awing them* into one body/ iff the sisis* had nott bin so v*ery great and* the most parte of the gentillmen and cuntry*men had so* many defecks [as] I fynd in the porte towns, and fear *also* in the rest of the cuntry, for I asure your Lo*rdshipe* they have neyther† store of munysions nor good *arms* and for the most parte of the towns lytell or noe a*rms are at* all left in them, The reason is this they being s*o guarded* cary their armes w^t^ them for their defence to the sea, *The* order taken w^t^ the deputie Lyftenants, for the better defe*nce of* those placis is this; first to Barycadee all those towns *as* strongly as may be, the placis wher to sett those Baryca*des* I have shewid them; Then to take such order that nonn take any Arms to sea w^t^ hym, w^t^outt leaving the preporcion he is charged w^t^ for the defence of his towne, and th*at* the mayor or other officers shall cause a revew wekly to be taken, and when any such defalt is fownd to punishe acordingly/.

Lykwise fynding greatt inconvenienc and *difficulti*es growe to the porte towns by reason of the ar*my which* is now held ther, w^ch^ is thatt the traynid Bands *are* composedid of the best menn of all the country, and *ther*for taken outt of many placis so distant that some *of* them come 20 mills to their randevous, by w^ch^ means *our* best menn being drawene from the towns upon the cost, have left them to the spoyle of the enymy, therfor w^t^ the advise of deputies Lyftenant itt is thought for in som poynts to alter thatt

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* In an accompanying note, Mr. Rowett says, the word 'sisis' is intended for *sizes*.

† This word is written in substitution for the cancelled "*lytell*."

course, and to order itt in this sorte, thatt no Captain of the traynid Bands shall draw a mann from the porte towns or vilagis next ajoynyng w^th^in 2 or 3 mylles, butt all those having their randevousis aparte and officers apoyntid in every village to comand them shall upon all alarams draw themselfs by the conduckt of the sayd officers to the porte towne apoyntid for their gard, wher som gentillmann of worthe, thatt dwels next unto the sayd porte is to take charg of them and of thatt place as of his garyson, and he *is* by no means to w^t^ draw hymself outt of thatt place to the ayd and assistance of any other towne, butt ther to abide at the place apoyntid to his charg/ the rest of the traynid and untraynid bands w^ch^ ar raysid outt of the inner parte of the cuntery ar to draw themselvs into divers heds or one as they shall see cause to second any town [that] shal be atemptid, this course is taken as most answerable to the nature of the atempt now mad upon this coste, and will contynue till your Lordshypps further order, Lykwise the deputies Lyfftenants for the better *garding and* for the better ordering of the cunt*ry will continue to* make a generall review on in another deby*rtment dail*ye, [to] se all the defecks suplyed, the ocasion of *which* is growen by favoring their pore neybours, *If you* shuld so thinke itt fitt itt were not amis to se*nd an exper*encid captaine to see thess things perform*ed The menn* duthe very much desir to have som captains sen*t to* them to lead them if the lyke ocasions prey*vail. They* desirid me in my letters to your Lordshipp to *say this* much unto you, as they will do lykwise in the*ir part.* so craving pardon for my so teadious *Letter* I humbley take my leave

he who desirs to doe *your*
Lordships all servis

THO BASKERVILE

Plymouthe this 5 of August.

The letter bears the following endorsements:

5 Aug: 1593.
1595.
S^r^ Thomas Baskervyle
to y^e^ Consill pr^o^
Plymoth.

To the most Honorable
the Lords of her ma^tis^
most Honorable pryvy
Counsell.

II.—STRAY NOTES (No. 1).—*The Manor of Penvrane and Advowson of the Church of St. Pinnock.*—*By* Sir John Maclean, F.S.A., *Honorary Member of the Royal Institution of Cornwall.*

Read at the Spring Meeting, May 23, 1871.

IN my researches in connection with my "History of the Deanery of Trigg Minor" I frequently meet with historical documents which, although of no immediate use to me, possess, I think, sufficient interest to be noticed in the pages of our Journal, and, in some instances at least, may be of value to other students of Cornish history. Such is the case with a record which I have recently discovered on the *de Banco Rolls* of Hilary term 1st Edw. IV., preserved in the Public Record Office, relative to the Manor of Penvrane and the Advowson of the Church of St. Pinnock, a notice of which I now submit to the Institution; and should the Council agree with me in thinking that it contains sufficient interest to justify its publication, I may hereafter, from time to time, have the opportunity of placing at its disposal similar communications.

The notice which I have now the pleasure to submit is the record of an action of *Quare Impedit*, brought by Sir William Botreaux, Knt., against Otho Colyn, Edward Coryton, and Walter Hill, Chaplain, upon a plea that they should permit him to present a fit person to the Church of St. Pinnock, which was then vacant, in his donation. The pleadings are not only of great interest as regards the history of the Church and Manor, but they contain, also, a vast amount of genealogical information concerning several ancient Cornish families. I shall abstract the proceedings as briefly as I can, following their general tenour.

Sir William Botreaux appeared before the Court, by Richard Wolston, his Attorney, and pleaded that he was seized in the Advowson of the Church of St. Pinnock, "*ut de uno grosso,*"* as of his fee and right in the time of peace of the Lord Henry 6th,

* Signifying as apart from a Manor.

late "*de facto et non de jure*," King of England; and that to the same Church he had presented a certain Thomas Edward, his Clerk, who, upon that presentation, had been duly instituted and admitted; that the Church was now again vacant by the death of the said Thomas Edward, and that it pertained to him to presènt; and that the said Otho Colyn, Edward Coryton, and Walter Hill impeded him, to his damage to the extent of £100.

Otho Colyn, Edward Coryton, and Walter Hill, by Henry Gylly their Attorney, appeared and defended themselves.

Otho Colyn pleaded that to him, and not to Sir William Botreaux, belonged the right of presentation: because, he said, that a certain John Shylston formerly was seized in the Manor of Penvrane with the appurtenances, to which the Advowson of the Church of St. Pinnock pertained, in demesne as of fee; and being so seized, to the said Church, being vacant, had presented a certain John Jaggeford, his Clerk, who, upon that presentation, was admitted and inducted; which same John Shylston had issue five daughters: viz., Margaret, the eldest; Katherine, second; Alice, third; Lucy, fourth; and Olive, fifth; and that he died seized of the said Manor with its appurtenances, which descended to the said Margaret, Katherine, Alice, Lucy, and Olive, as his daughters and heirs; and that they into the same Manor entered and were of it seized in demesne as of fee; that Margaret had issue a certain Roger Bastard, and of her portion (proparte) of the said Manor and its appurtenances died seized, after whose death the said Roger into the whole of her portion, as son and heir of Margaret, entered and was of it seized in demesne as of fee. And that Katherine had issue Nicholas Resethercombe, and of her portion of the said Manor with its appurtenances died seized; after whose death the said Nicholas into the whole of her portion, as her son and heir, entered and of it was seized in demesne as of fee. And that Alice had issue John Ferrers, and of her portion of the Manor with its appurtenances died seized, after whose death the same John into the whole of her portion with its appurtenances, as her son and heir, entered and of it was seized in demesne as of fee. And that the aforesaid Lucy had issue Gibert de Boterton, and of her portion of the Manor with its appurtenances died seized, after whose death the same Gilbert into the whole of her portion, as her son and heir, entered and of it was seized in demesne as of

fee. And that the aforesaid Olive had issue John Giffard, and of her portion of the said Manor died seized, after whose death the same John Giffard into the whole of that part with its appurtenances, as her son and heir, entered and of it was seized in demesne as of fee. Afterwards the said Church became vacant by the death of the aforesaid John Jaggeford, and the said Roger, Nicholas, John Ferrers, Gilbert, and John Giffard presented a certain Adam de Penfenton, their Clerk, who upon that presentation was inducted. Afterwards the said Church became vacant by the death of the said Adam de Penfenton, and it was agreed between the several portioners that the aforesaid Roger, as son and heir of the eldest daughter, should have the first turn; and he presented a certain Walter Lower, Clerk, who upon that presentation was inducted. And afterwards the said Nicholas Resethercombe of his portion of the Manor died seized, after whose death that portion descended to a certain Michael Langaker, as kinsman and heir of the said Nicholas, viz., as son of Johanna, daughter of the said Nicholas, and that the same Michael into the whole of that part entered and of it was seized in demesne as of fee; and the said Church afterwards becoming vacant by the resignation of the aforesaid Walter Lower, the aforesaid Michael, as in his turn, presented a certain John Stevyn, who upon his presentation was inducted. And the aforesaid John Ferrers afterwards had issue Margaret, and of his portion of the said Manor with the appurtenances died seized, after whose death the same Margaret, as daughter and heir of the said John Ferrers, into the whole of that portion entered, and of it was seized in demesne as of fee; and had issue John Trevage, and of that portion of the said Manor died seized, after whose death that portion descended to the said John Trevage as son and heir of Margaret, and at that time the said John, being within the age of 21 years, and because the said Margaret held her portion of the said Manor of the said William Botreaux by Knight's service: viz., the 20th part of one Knight's fee, the said William Botreaux was seized in the custody of the body, &c., of the said John Trevage, and the whole portion of the said Manor with the appurtenances, and that to the said John Trevage, after the death of the said Margaret, descended the Church aforesaid, afterwards vacant by the death of the aforesaid John Stevyn, and the said William Botreaux, as Guardian of the

said John Trevage and of his portion of the said Manor, in the right and turn of the said John, and by reason of his minority, presented a certain John Knoke, his Clerk, who, upon that presentation, was admitted and inducted. And the aforesaid Gilbert afterwards had issue certain Claricia and Johanna, and of his portion of the said Manor with the appurtenances died seized; after whose death the said Claricia and Johanna, as his daughters and heirs, into his portion entered, and of it were seized in demesne as of fee; and the said Claricia, being of her portion seized, granted the same to a certain John Gattecom, to hold to him and his heirs for ever, by virtue of which grant the said John Gattecom of that portion was seized in demesne as of fee, and, being so seized of the same portion, enfeoffed the said William Botreaux, to hold to him and his heirs for ever; by virtue of which feoffment the same William was of it seized in demesne as of fee. And the aforesaid Johanna, daughter of Gilbert, had issue Thomas Trevthyan, and of the aforesaid her portion of the said Manor with the appurtenances died seized, after whose death the said Thomas into the whole of that part with the appurtenances, as son and heir of the said Johanna, entered, and of it was seized in demesne as of fee; and being seized of that whole part, gave and granted the same to a certain Thomas Burnard, to hold to him and his heirs for ever; by virtue of which gift the same Thomas Burnard was of it seized in demesne as of fee. And afterwards the Church aforesaid became vacant by the death of the aforesaid John Knoke, by which the aforesaid William Botreaux, as in the fourth turn, presented the said Thomas Edward, who, upon that presentation, was admitted, instituted, and inducted into the same. And the aforesaid John Giffard had issue a certain Ingreta, and of his portion of the aforesaid Manor with the appurtenances died seized, after whose death Ingreta, as daughter and heir of the said John, into his portion of the said Manor, &c., entered and was of it seized in demesne as of fee, and had issue John Colyn, and in the same state of that portion died seized. After whose death the said John Colyn into the whole of her portion, as son and heir of the said Ingreta, entered and of it was seized in demesne as of fee, which John Colyn had issue Otho Colyn, and, in the same state, of that portion died seized, after whose death the said Otho, as son and heir of the said John

Colyn, entered and was of it seized in demesne as of fee. Afterwards the said Church became vacant by the death of the aforesaid Thomas Edward, and being so vacant, to the said Otho, as in the fifth turn, at present belongs the presentation, as the Church to the aforesaid Manor pertaining, were it not that the aforesaid William Botreaux was seized of the Advowson of the said Church "*as in grosso,*" as the said William by his declaration above supposes, and this the said Otho is prepared to verify, and he petitions judgement and the Bishop's Writ.

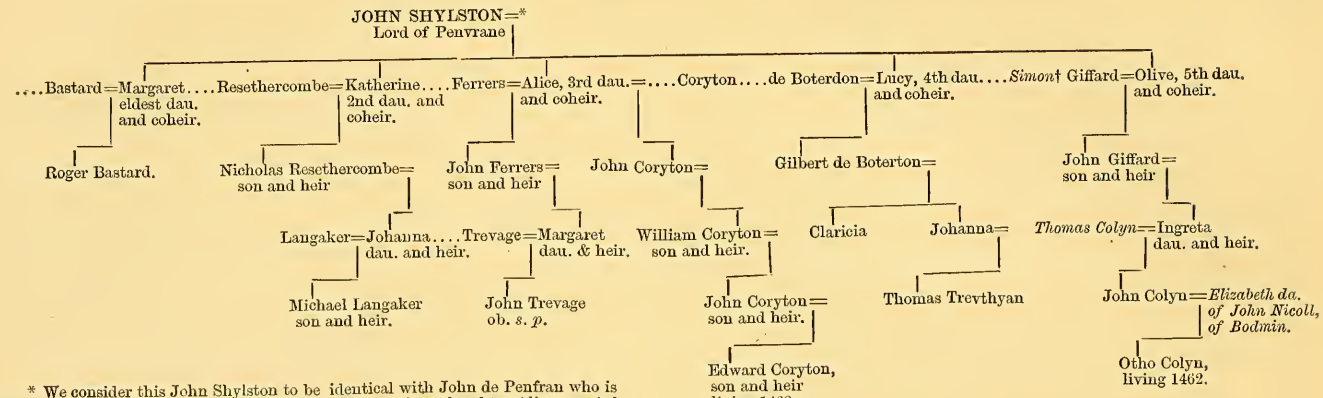
Walter Hill said that the aforesaid William Botreaux ought not to have an action against them. He said that the aforesaid John Shylston was formerly seized in the Manor of Penvrane with the appurtenances, to which the advowson of the said Church pertained, &c., (repeating all the pleadings of Otho Colyn), and saying that the said Church was vacant by the death of Thomas Edward, and that the aforesaid Otho Colyn, as in the fifth turn, to that Church, so vacant and pertaining to the aforesaid Manor, presented the same Walter now one of the defendants, who, upon that presentation, is admitted, instituted, and inducted into the same, were it not that the said William Botreaux was seized of the advowson of the said Church, "*ut de uno grosso,*" as the said William, by his above declaration, supposes; and he is prepared to verify his right and thereof petitions judgement, if the action of the said William Botreaux against them ought to be maintained.

Edward Coryton repeated all the foregoing pleadings down to the induction of Walter Hill, and protested further that the aforesaid John Trevage of his portion of the aforesaid Manor with the appurtenances died seized, without heirs of his body, after whose death that portion descended to a certain William Coryton, as kinsman and heir of the said John Trevage, viz., as son of John, son of Alice, mother of the aforesaid John Ferrers, father of Margaret, mother of the said John Trevage; and that the same William Coryton into the whole of that portion of the said Manor, &c., after the death of the aforesaid John Trevage, entered, and was of it seized in demesne as of fee, and of it in that state died seized, after whose death that part, with the appurtenances, descended to the said Edward Coryton, one of the defendants, as kinsman and heir of the said William Coryton: viz., as son of John, son of the same William Coryton, and that the said Edward,

after the death of the said William Coryton, into that portion entered and was of it seized in demesne as of fee, and is at this time so seized; and, saving to the said Edward and his heirs his right of presenting to the said Church as pertaining to the Manor aforesaid in his turn, said he had not impeded the said William Botreaux to present to the said Church, as the said William Botreaux by his writ and declaration above supposes: and upon this he places himself upon the country, and the said William Botreaux did likewise.

And the aforesaid William Botreaux did not acknowledge the above allegation of Otho Colyn and Walter Hill, and said that he was seized in the Advowson of the said Church "*ut de uno grosso,*" as shewn in his above declaration, and of this he petitioned an enquiry by the country, and the said Otho Colyn and Walter Hill likewise. And a day was given in Easter term.

From the foregoing pleadings is deduced the following important contribution to Ancient Cornish Genealogy.



* We consider this John Shylston to be identical with John de Penfran who is mentioned in the Deeds following numbered 8 and 9, whose daughter Alice married Nicholas Ferrers If this be so Serlo must have died *s. p.*, and his sisters have become his heirs notwithstanding that he is not mentioned in the pleadings. The following conjectural pedigree may be deduced from the Deeds. The name of Shylston is a corrupted form of Silveston.

John de Silveston, Lord of Penvran=

Serlo de Silveston=

John de Penvran living 1285 and 1298=

Adam de Penvran living 1315, say then 21 years of age=

John Shylston, Lord of Penvran=

Serlo de Penvran, ob. *s. p.*, Margaret, Katherine, Alice, Lucy, Olive,

† The names in italics are supplied from other sources. See *Hist. of Trigg Minor, Sub. Helland.*

No. 1.

Sciant presentes et futuri quod Ego Johannes de Silueston dominus de Penfran dedi concessi et hac presenti Carta mea confirmaui pro homagio et seruicio suo Serloni filio meo totam terram meam de Penfran cum omnibus pertinentiis salua mihi aduocacione ecclesie de Sancto Pinnocho quamdiu aduixero et saluo mihi bosco meo de Penfran quamdiu aduixero. Ita quod post decessum meum aduocatio dicte ecclesie et boscum predictum remaneant imperpetuum predicto Serloni et heredibus suis Habendum sibi et heredibus suis tenendum de me et heredibus meis libere quiete pacifice integre imperpetuum in feodo et hereditate faciendo inde mihi uel heredibus meis regale seruicium: videlicet quantum pertinet ad feodum unius militis pro omni seruicio querela demanda et exactione. Pro hac autem donatione et concessione dedit mihi dictus Serlo centum marcas sterlingorum in recognicionem. Ego vero Johannes et heredes mei predicti tenemur warantizare dictam terram cum pertinentiis Serloni et heredibus suis prescriptis contra omnes homines et feminas. Quod ut ratum et gratum et stabile perpetuis perseuerit temporibus presenti carte sigillum meum apposui. Hiis testibus domino Odone de Treuerbin, domino Bernardo de Bodbran, domino Ricardo de Tregilles, domino Willelmo de Cereseaus, Reginaldo de Northwode clerico, Nicholas de Thudeford, Johanne de Treuigor, Gilberto de Treaga, Johanne de Treuilyas et aliis. (not dated, but about the time of Edward I.) Indorsed, "Carta Villa de Penfran."

No. 2.

Hoc scriptum Testatur anno gracie M° CC° Lxxx quinto In festo Sancte Crucis in Mayo quod Ego Adam de la Leye tradidi ad firmam Joheli fratri meo terciam partem totius terre mee in villa de la Leye jacentem: Videlicet totius illius terre quam habui hereditarie post decessum patris mei vna cum tercia parte illius terre quam habui nomine emptionis de Serlone de Penvran cum illa domo quam Gilbertus Longus tenuit In bosco in prato in campo in viis in semitis in aquis et in omnibus pertinentiis suis et liberis exitibus et consuetudinibus dictis terris adiacentibus usque ad finem triginta annorum proximo sequencium Habendum et tenendum de me et heredibus meis uel assignatis sibi et heredibus suis uel assignatis libere pacifice usque ad finem dicti termini ad omne commodum suum inde faciendum et cum croppo ultimi anni usque ad festum sancti Michaelis Reddendo inde annuatim mihi et heredibus meis sex denarios ad duos anni terminos: scilicet ad Pasche et ad festum Sancti Michaelis equis porcionibus pro omni seruicio seculari exaccione ac demanda saluo Regali seruicio quantum pertinet ad terciam partem tocius prenominate terræ et salua una precaria per annum ad metendum in autumpno mihi et heredibus meis uel assignatis facienda in Villa de la Leye Preterea concessi dicto Joheli et heredibus suis uel assignatis si contingat quod absit illos incurrisse dampnum siue jacturam pro meo defectu uel aueria illorum extra terram supradictam pro nostro defectu fugasse totum dampnum uel jacturam sive detrimentum aueriorum suorum per uisum legalium virorum plenarie restaurabimus. Concessi insuper inueniendi custus

unius domus medietatem de quatuor furcis infra tres annos primos si placuerit sibi edificare. Ita vero quod tota supradicta terra cum domibus prenominatis mihi et heredibus meis uel assignatis in finem termini sine contradicione reuertatur. Et ego vero predictus Adam et heredes mei uel assignati mei totam supranominatam terram ut prescriptum est dicto Joheli et heredibus suis uel assignatis usque ad finem dicti termini contra omnes gentes warantizare tenemur. In cuius rei testimonium huic scripto sigillum meum apposui. Hiis testibus Johanne domino de Penvran, Gilberto Juniori de Treyage, Johanne Matchock de Bodbran, Gilberto de Schanan, Johanne de Lodegard et aliis. Pro hac autem firma habenda dedit mihi dictus Jobel viginti quinque solidos sterlingorum pre manibus.

No. 3.

Omnibus Christi fidelibus ad quos presentes litere preuenerint Johannes de Lozeard salutem in domino sempiternam. Noverit vniuersitas vestra me concessise et licenciam dedisse Johanni de Penfran et heredibus suis siue assignatis quod licite possint attachiare bedum ductus aque molendini sui de Penfran ad terram meam de Lozeard sine aliquo impedimento uel contradictione heredum meorum siue assignatorum Reddendo inde annuatim mihi et heredibus meis uel assignatis tres denarios ad festum Sancti Michaelis pro omnibus seruiciis querelis ac demandis. Et Ego dictus Johannes de Lozeard heredes mei uel assignati predictum bedum ductus aque dicto Johanni de Penfran et heredibus suis uel assiguatis contra omnes homines et feminas warantizabimus defendemus et acquietabimus imperpetuum In cuius rei testimonium huic presenti litere sigillum meum apposui Hiis testibus Augero de bocet, Waltero de Lozeard, Magistro Ricardo de Treworgy, domino Johanne, Capellano, et Gilberto de Pennard. Datum apud Lessorum die Lune in festo Sancte Fidei virginis Anno Regni Regis Edwardi vicesimo sexto. (Oct. 6, 1298).

No. 4.

Pateat vniversis per presentes quod Ego Willelmus de Botreaux recongnossco me recepisse ab Adam de Penfran quinque marcas sterlyngorum in quibus mihi tenebatur pro relevio terrarum suarum. In cuius rei Testimonium has Literas sibi feci fieri patentes sigillo meo sigillatas Datum apud Lostuyiel die Lune proximo post festum Edmundi Episcopi Anno Regni Regis Edwardi filii Reg Edwardi nono. (17 Nov., 1315).

No. 5.

Pateat vniversis per presentes quod Ego Reginaldus de Botreaux dominus de Botylleth recepi de Serlone de Penfran tenente meo manerii de Penfran quadraginta solidos Sterlingorum in persolucionem auxilii tam ad filium meum militem faciendum quam ad filliam meam primogenitam maritandam: viz., pro vno feodo integro quod predictus Serlo de me tenet vt de dicto manerio de Botylleth de quibus quidem quadraginta solidis Ego dictus Reginaldus fateor me plenarie esse pacatum. In cuius rei testimonium presenti

acquietancie sigillum meum apposui. Data apud Botylleth die Jouis proxima post festum Sancti Dunstani Anno Regni Regis Edwardi tercii post conquestum quintodecimo. (23 Oct., 1341).

No. 6.

Omnibus Christi fidelibus ad quorum notitiam presens litera peruenerit Johannes dominus de Penuran salutem in domino sempiternam. Noveritis me recepisse homagium Ricardi de Treben de tota terra de Comba et Sancti Pinnoci excepta terra et landa que vocatur "le hyret lond" juxta boscum nostrum de Conuent quam terram calumniabo et propter hoc de illa terra predicta predicti Ricardi homagium non recepi. In cuius rei testimonium presenti litere sigillum dicti Ricardi est appensum. (Not dated).

No. 7.

A touz ceux que cestes lettres verrount (ou) orrount Serle de Penfran seygnur de Trewynt saluez en Deux Pur ceo que jeo ay feffe Alice que fust la femme Nichol de fferrers de touz mes rentes terres et tenemenz que jeo avoi en Trewynt en Roslaunde a terme de sa vie come la chartre de ceo feste purporte. Et jeo voil et jeo grante et la dyste Alice de la suwe part grante que quel hure que la dyste Alice seit purpaye de dys marcs dargent de dystes rentes terres et tenemenz de Trewynt come i sunt nomes en la chartre qest entre nous fest a terme de sa vie que mesme ceste chartre seit pur nule et wyde en luymesmes. Et si avynge que la dyste Alice meurge eynz ceo que ele soit pleinementes purpaye de dist dys marcs que Deuz defend. Jeo voil et jeo grante que les executors la dyste Alice ou les ministratours de biens de la dyste Alice teygnent les rentes et les seruices avantdistes tant que les dist dys marcs seient pleynementes purpayes. Et si avynge que en le moyntemps nul de tenannz de Trewynt ffrankes ou altre morge dedenz les premers deux aunz et demy et heriet ou relef eschete seit leaumentes alowe et acounte en payement de dist dys marcs come covenaunt est. Et si ensi seit que le dist Serle face la paye de dist dys marcs dedenz les deux auns procheyns avenir que la diste Alice rende au dist Serle les avauntdistes terres et tenemenz sous poyne de xl livres. En tesmoinance de quele choses a cestes Endentures ount mys lour seals entrechaungeablement. Escrit a Seynt Pynnok Judy procheyn avant la feste Seynt Laurenz en lan du regne le Roi Edward le tierce pus le conqueste sesyme.

No. 8.

Pateat vniuersis per presentes, quod nos Radulphus Pomeray et Alicia que fuit vxor Nicholai de Ferrers, executores testamenti dicti Nicholai defuncti, recepimus et habuimus de Serlone filio et herede Johannis de Penfran, quinquaginta marcas sterlingorum, in quibus predictus Johannes de Penfran predicto Nicholao tenebatur, pro maritagio facto inter eundem Nicholaum et Aliciam filiam suam predictam, quas quidem quinquaginta marcas idem Johannes dicto Nicholao in subsidium oneris matrimonii ferendi cum me Alicia predicta promisit. De quibus vero quinquaginta marcis fatemur nobis

plenarie fore satisfactum. Unde predictum Serlonem, heredes et executores suos, siue bonorum suorum administratores, quietos clamamus per presentes. Ita quod nos, nec aliquis nomine nostro, eundem Serlonem, nec aliquem alium premissorum occasione inquietare seu implacitare poterimus in futurum. Sed ab omni actione, ratione premissorum, sumus exclusi per presentes. In cuius rei testimonium sigilla nostra presentibus sunt appensa. Et quia sigilla nostra pluribus sunt incognita, sigillum Decani de Est Weuelschire, presentibus apponi procuravimus. Datum apud Wolliston, die Lune proximo post festum Sancti Johannis Baptiste, anno domini Millesimo CCC° quadragesimo tertio, et regni regis Edwardi Tertii a conquestu Anglie septimo decimo. (30 June, 1343).

No. 9.

Noverint vniuersi per presentes me Otonem Nicoll de Penfoes in comitatu Cornubie gentilman teneri et firmiter obligari Thome Treffry de ffowy in eodem comitatu gentilman in centum libras sterlingorum, soluendas eidem Thome, heredibus vel executoribus suis, aut suo certo attornato in festo Annunciationis beate Marie Virginis proximo futuro post datum presentium sine dilatione, ad quam quidem solutionem bene et fideliter faciendam, obligo me, heredes et executores meos per presentes. In cuius rei testimonium presentibus sigillum meum apposui. Datum die dominica proximo ante festum Conversionis Sancti Pauli, anno regni regis Henrici sexti post conquestum Anglie vicesimo quarto. (24 January, 1445).

The condicon of thebowe Wreten obligacion ys this, that yf so be that Otys Colyn, sone and heyr of John Colyn of Hellond, and the feffeys of the sayde John Colyn, enfeffe or do to be enfeffed, Thomas the sone and heire apparent of Thomas Treffry of Fowey and Elizabeth the suster of the sayde Otys and the heyres of ther toerne bodyes be getten als so sure of the Maner of Penfran with the appurtenans of all there part savyng the Vouson of the Churche of Seynt Pynnok as the sayde Thomas Treffry by avyse of hys Councell woll devyse at the Costys of the forsayde Otys Colyn and yf the sayde Thomas the sone be content of x pondes of money coynet ynn case that John Nanfan Squyre and the foresayde Otys woll saye that the poyntement was suche at loundon apon the comynycacion of the mariage be twene Thomas the sone and Elizabeth the suster of the sayde Otys and all so yf John Nicoll of Bodmyn delyuere to the sayde Thomas the sone an C s of sylver Jowellys prouidyt all way that alle thys condicions to be fulfylled withynne the ffeste of Ester next folowyng the date of the bowe Wryten obligacion that thanne this obligacion be had for north wer ellys stonde yn hys strenthe and vertu. (Seals lost).

No. 10.

Sciant presentes et futuri quod nos Johannes Colsyll chivaler, Johannes Nanfan, Johannes Nycoll de Bodmin, Johannes Treweket, et Johannes Bere Attregaren dimisimus, concessimus, et hac presenti carta nostra confirmauimus Thome Treffry filio et heredi Thome Treffry de ffowy et Elizabete vxori sue,

totum manerium nostrum de Penvrayn, cum omnibus suis pertinentiis, excepta aduocatione ecclesie de Seynt Pynnek, quod habuimus ex dono et feoffamento Johannis Colyn, habendum et tenendum totum manerium predictum cum omnibus suis pertinentiis, excepta pre-excepta, prefato Thome filio et heredi predicti Thome et Elizabeta, vxori sue, et heredibus de corporibus eorum legitime exeuntibus, de Capitali Domino per redditus et seruicia inde debita et de iure consueta. In cuius rei testimonium huic presenti carte nostre sigilla nostra apposuimus. Hiis testibus Otone Nycoll, Thoma Bere, Roberto Dyer, Johanne Smale, Johanne ffenell, capellano, et aliis. Datum apud Bodmyniam die Veneris proximo ante festum Sancti Georgii Martyris, anno regni regis Henrici sexti post conquestum Anglie, vicesimo quinto. (22 April, 1447).

No. 11.

Sciant presentes et futuri quod Ego Oto Colyn Armiger, dedi, concessi, et hac presenti Carta mea indentata confirmavi, Thome Treffry filio et heredi Thome Treffry de ffowy et Elizabeta vxori sue, sorori mee totum manerium meum de Penvrayn, cum omnibus suis pertinentiis, excepta aduocatione ecclesie de Seynt Pynnek, habendum et tenendum totum manerium predictum cum omnibus suis pertinentiis, excepta pre-excepta prefato Thome filio et heredi predicti Thome et Elizabeta vxori sue sorori mee et heredibus de corporibus eorum legitime exeuntibus de me et heredibus meis. Reddendo inde annuatim michi et heredibus meis unam rosam rubeam, ad festum Nativitatis Sancti Johannis Baptiste. Et faciendo pre manibus meis et heredum meorum Capitalium dominorum redditus et seruitia inde debita et de iure consueta. Et Ego vero prefatus Oto et heredes mei, totum predictum manerium cum omnibus suis pertinentiis excepta pre-excepta prefato Thome filio et heredi predicti Thome et Elizabete vxori sue, sorori mee et heredibus de corporibus eorum legitime exeuntibus, contra omnes gentes warantizabimus et defendemus imperpetuum in forma predicta. In cuius rei testimonium huic presenti Carte mee indentate sigillum meum apposui. Hiis testibus Otone Nycoll, Thoma Bere, Roberto Dyer, Johanne Smale, Johanne ffenell capellano, et aliis. Datum apud Bodmyniam, die Veneris proximo ante festum Sancti Georgii Martyris, anno regni Regis Henrici sexti post conquestum Anglie vicesimo quinto. (22 April, 1447).

No. 12.

Nouerint vniuersi per presentes me Otonem Colyn armigerum attornasse et in loco meo posuisse dilectum michi in Christo Robertum Dyer et Johannem ffenell capellanum, meos veros et legitimos attornatos, coniunctim et divisim, ad intrandum, ponendum et deliberandum vice et nomine meo Thome Treffry filio et heredi Thome Treffry de ffowy et Elizabete vxori sue, sorori mee plenam et pacificam seisinam de et in toto manerio de Penvrayn, cum omnibus suis pertinentiis, excepta aduocatione ecclesie de Seynt Pynnek, secundum vim, formam et effectum cuiusdam Carte per me facte, prout in eadem Carta plus plenius apparet. In cuius rei testimonium huic presenti scripto meo

sigillum meum apposui. Hiis testibus, Otone Nycoll, Thoma Bere, Roberto Dyer, Johanne Smale, Johanne ffenell capellano, et aliis. Datum apud Bodmyniam die Veneris proximo ante festum Sancti Georgii Martyris anno regni Regis Henrici sexti post conquestum Anglie, vicesimo quinto. (22 April, 1447).

No. 13.

Omnibus ad quos presens scriptum peruenerit Elizabeta relicta Johannis Colyn, salutem in Domino. Noueritis me prefatam Elizabetam in pura viduitate mea et libera potestate remisisse, relaxasse et omnino quietum clamasse Thome Treffry filio et heredi Thome Treffry de ffowy et Elizabete vxori sue, filie mee et heredibus inter eos legitime procreatis, totum ius meum et clameum quem umquam habui, habeo, seu quovismodo habere potero, ratione dotis mee manerii de Penffrayn cum suis pertinentiis. Ita videlicet quod nec Ego predicta Elizabeta nec aliquis alius nomine meo aliquid iuris vel clamei in predicto manerio cum suis pertinentiis, nec in aliqua inde parcella de cetero, exigere, clamare, seu vendicare potero, nec poterit in futurum. In cuius rei testimonium huic presenti scripto sigillum meum apposui. Hiis testibus, Thoma Bere, Roberto Dyer, Johanne Smale, et aliis. Datum Bodmyniam penultimo die Maii anno regni Regis Henrici sexti post conquestum Anglie vicesimo quinto. (30 May, 1447).

My predecessors, Historians of Cornwall, have passed over the parish of St. Pinnock with very scanty notice. What Lysons states will be familiar to the Members of the Royal Institution. He says that "the Manor of Penvrane anciently belonged to the "family of Silvester (should have been Silves*ton*) afterwards called "Penvrane before the year 1426. Since then it is supposed to "have passed, towards the latter end of the following century, to "the Colyns. Elizabeth Colyn daughter of John Colyn brought "it as a marriage portion to the Treffry family." The date 1426 is clearly a mis-print. The author intended to write 1226.* Hichens in following Lysons very properly corrects this error, but he adds little to Lysons' statement.†

* The deed of 1226 to which reference is here made did not fall under my notice at Place, and there is some uncertainty as to its date as described by Mr. Austen in his letter to Lysons. Mr. Austen says it is a grant from John de Lozeard to John de Penfran of a watercourse through the lands of Lozeard unto the mill of the said John de Penfran, the said John de Penfran paying yearly the rent of 3d. Mr. Austen thought the watercoure came through Lodge in the parish of Liskeard. We are inclined to think that the deed referred to by Mr. Austen is that printed as No. 3 in the previous collection, which agrees in all respects, save the date.

† The statement of Lysons, having been derived from the late Mr. Austen of Place, afterwards Treffry, is in the main correct.

The Manor has continued in the family of Treffry until the present time; and, being on a visit at Place some two or three years ago, Dr. Treffry kindly allowed me to have access to his Muniment room and to make transcripts of some ancient deeds, among others some relating to this Manor, and which, with his permission, I am now enabled to print in illustration of the descent of this Manor and Advowson, with respect to which the late Mr. Austen (Treffry) avowed himself to be greatly perplexed. It will be remembered that in the above pleadings it appears that William de Botreaux was Chief Lord of the fee of Penvrane, and had the custody of the body and lands of John Trevage during his minority. The foregoing deeds shew that this right was vested in him as Lord of Botylleth* of which great Lordship the Manor of Penvrane was, and is still, a member.

It appears from these deeds that in 25 Henry VI (1447) the whole of the *Manor* of Penvrane had become vested in Otho Colyn, and was by him given to his sister. It does not always follow that such a full description as "*totum manerium meum*" conveys the whole Manor, for when a Manor is under partition, undivided, each portioner would so describe his interest. It is, however, probable that some arrangement had been come to between the portioners for the division of the lands, by which the Colyns acquired the Manorial rights. The Advowson of the Church did not admit of being divided into severalties, and hence continued, and still continues, to be held by the representatives of the coheirs of John Shylston as joint tenants.

In 1382 we find a fine was levied, in which Nicholas (the name is torn off) was plaintiff and Robert Carnedon and Margaret his wife, and Stephen Trewynt and Isolda his wife, were defendants, by which, *inter alia*, one fifth part of the Manor of Penvrane with the appurtenances, except 30 acres of land in the same fifth part, was vested in Robert Carnedon and Margaret his wife and the heirs of their bodies and, if they should die without heirs of their bodies, remainder to the heirs of the body of the said Margaret, and, in default, remainder to the said Stephen and Isolda and the heirs of their bodies, in default of such issue remainder to the right heirs of Margaret. And the 30 acres of

* See No. 5.

land were granted to Stephen Trewynt and Isolda his wife and the heirs of their bodies, and in default remainder to Robert and Margaret and the heirs of their bodies, and in default of such issue remainder to the right heirs of Margaret.* It would, I think, from this appear that Margaret and Isolda were sisters and coheirs of one of the portioners, or her representatives, and that even at that early date the Manor and lands had been partitioned. And this would seem to be confirmed by the state of the lands pertaining to this Manor in the beginning of the present century. The Manor was held by Mr. Austen, as the representative of Elizabeth Colyn and the Treffry family. Mr. Coryton, as the representative of Alice, one of the coheirs, held one small coppice wood of about 6 acres and 2-3rds of another wood of about 11 acres (the other 1-3rd of which was held by Mr. Austen), and he had held the estate to which the wood belonged, but had recently sold it to Mr. Little. He had also held another small estate which he had sold to the same person.† Mr. Bate held one of the Bodranes and some other lands—all these were parcel of the Manor of Penvrane.

The Advowson was held in joint tenantry, though the portioners seem from some causes to have become reduced to three. According to Tonkin, in his time the right of presentation was vested in Mrs. Manley, widow of John Manley, Esq., in her own right, John Treffry, Esq., and Robert Hoblyn, Esq. Which of these parties held the Coryton portion, temporarily, does not appear. When Lysons wrote, the portioners, Mr. Austen and Mr. Coryton, had still their turns in the presentation, and Mr. Bate had sold his portion to the Rev. Joseph Pomery, Vicar of St. Kew, which portion has since passed to the Rev. J. Rawlings, so that at present the Patrons of this benefice are A. Coryton, Esq., the Rev. E. J. Treffry, and the representatives of the late Rev. J. Rawlings.—The last presentation was made by Dr. Treffry a short time ago.

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* *Pedes Finium 5th Rich. II, Easter, No.* 2.

† In a deed dated 31st January, 21st June (1623-4), by which William Coryton, of Newton Ferrers, Esq., conveyed to Sir Warwick Hele, of Wembury, Knt., certain lands, &c., in the neighbourhood of Liskeard, there is a particular reservation of all his lands and tenements in the parish of St. Pinnock, and the Advowson and right of presentation to the Church of that parish. (Papers in Muniment Room, at Coker Court, Co. Somerset).

III.—*Notes on the similarity of some of the Cornish rock-names and miners' terms, to Irish words.*—*By* G. Henry Kinahan, M.R.I.A., &c.

Communicated to the Spring Meeting, May 18, 1872, *by* William Jory Henwood, F.R.S., F.G.S., *Vice-President of the Institution.*

WHILE examining the rocks in various parts of Ireland it was observed that the Irish-speaking people understood many of the Cornish miners' terms and names, although their pronunciation of them was somewhat different. This opinion was confirmed and strengthened by reading a late publication entitled "Metalliferous Deposits and Subterranean Temperature," by W. J. Henwood, F.R.S., &c., &c.; in which the similarity of the Cornish and Irish words was strikingly apparent. In consequence of this, and after a correspondence with the learned author of that work, I am emboldened to lay before the society the following Paper. I must, however, premise that my knowledge of the Irish is very limited, and that I would not presume on my own authority to attempt a comparison of the words in the different dialects of Cornish and Irish, were it not for the assistance which has been afforded me by my friend, the Rev. W. Kilbride, A.B., Vicar of Aran, Galway; who has long studied the latter.

Irish words, when adopted into or pronounced in English, have been greatly altered, and in many ways corrupted; the transformation, in some cases, being so great that the words are scarcely recognizable. These corruptions and extraordinary changes are to be met with in a variety of cases, which need not now be mentioned, as those wishing for further information may be referred to that interesting work: "Irish Names of Places," by P. W. Joyce, LL.D., M.R.I.A., &c.

It must also be remembered, in an investigation of this kind, that many Cornish and Irish names and terms are chiefly derived from traditional pronunciation; also, that local technical terms are often difficult to deal with and obscure in their derivations, for

even in some parts of Ireland there are terms used, which are entirely unknown in other parts of that island. Names too and appellations are often imposed, not from their fitness or descriptive appropriateness, as often they are devoid of this;—a word, an exclamation, an ironical expression, or some such, may give rise to a term; consequently sometimes it is impossible to render the meaning in accordance with the original intention. Many Philologists of the present day have agreed that the European tongues for the most part belong to one great family called the Aryan, which embraces Greek, Latin, German, Celtic, &c., with their several sub-divisions or dialects. To these languages they apply the term sister-tongues, which supposes some parent language now extinct from which they are derived; many words in these different languages being cognate, although they may not be derived one from the other.

To me it appears, from all I can glean upon the subject, that one important element in the investigation has, till within the last few years, been overlooked, if not contemptuously cast aside, namely, the Irish Language, which, if thoroughly examined, would be found, not only of importance, but also of essential service, in elucidating the mystery of the probable relations of the different members of the Aryan family.* Any further remarks on this highly interesting topic would, however, be out of place in a paper devoted to a minor consideration.

The accompanying Glossary was thus formed:—at the first I was supplied with a list of terms by Mr. Henwood; this I supplemented from the Glossary at the end of Pryce's valuable work.† Subsequently all words apparently Celtic were compared with existing and obsolete Irish terms, taken from every source to which we had access. To some words evidently Cornish, we could attach no likely meaning; these therefore are omitted. Of some of those given, the explanation may be considered inapplicable; some of these, however, when explained from the Irish have a

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* Pictet, Ebel, Nigra, &c., are now investigating this subject abroad, while at home we have Crowe, Whitley Stokes, O'Mahony, and other members of the Royal Irish Academy, also engaged in it.

† *Minerals, Mines, and Mining.* By W. Pryce, of Redruth, in Cornwall. London, 1778.

signification which accords with the Cornish derivations found in Pryce's list. The old spelling, as given by Pryce, and the modern forms of the words, are often very different; Pryce therefore is an invaluable assistant in such an investigation.

ASTEL. According to Pryce synonymous with *stull*, Irish *sdiall*, a plank or beam.

ASTYLLEN. A small ward or stoppage in an adit, to prevent the full passage of the water; Irish *eas* or *os* and *tuilleadh*. *Eas* or *os* is an old word for "water," while *tuilleadh* means "to flow."

ATTAL; ATTLE; ADAL; ADDAL. Refuse or "deads." There is the Irish word *adhal*, which signifies evil (bad), and there is the word *aithla*, signifying a rag, or anything worthless.

BAL. A place where a number of people meet together in spalling or sorting ore; similar to "*bal*," to gather, to heap up. From the same root is *Baile*, a town, where a number of people live together.

BEU-HEYLE. *Beo*, living; and *heyle*, or *suil*, an orifice or opening, such as the eye. This derivation would explain the modern expression, "taking the eyes out of a mine"; that is, taking all the rich portions out of it.

BOTTOM IN FORK. When all the bottoms are unwatered. This may be a combination of a Celtic and an English word; as *forc thuidh* in Irish (pronounced *forkey*) is anything that has lost its sap or moisture. Originally it only applied to a substance in which holes were bored to form outlets through which the moisture would escape.

BUCKING; BUCKED ORE. Pettus, in his *Fleta Minor*, says the term originally signified "washing or wet-stamping ores." It therefore seems to be allied to the word *bog*, to stir up or soften. In Ireland they say *bogadh natalamhna*, breaking by stirring the land. *Bogadh* is also used when the sea is agitated, or a storm is raised.

BURROWS. Heaps of attals, deads, or earth. This evidently is similar to *borradh* (pronounced burrow), to increase or grow large; as the heaps of deads or attal (burrows) are always increasing. The word is commonly applied to trees when budding.

CAL; GAL. See *Gal*.

COCKLE. Stroil.—Pryce states that Cockle, in Cornish, means a weed. In Irish there is a similar word *cogal*, a weed resembling wheat. Hence the term, as *cockle* may be mistaken for tin ore, while in reality it is only a weed, or useless, to the miner.

COFER. Cofar or Kopher (Cornish) a chest. Irish, *cofra*, a chest. This latter word is now nearly obsolete.

COFFIN. Old open workings. There is the Irish word *cabhan* (pronounced *cavaun)*, which means a hollow. There is also the word *cobhan* (pronounced *cowan)*, a coffer.

COSTEAN. To trace or find tin. Probably similar to *cos* (pronounced *cuss*) foot, or the bottom of anything, and *stan*, tin. As we now say "go to the bottom of it," if we want to search out anything.

CUARE; QUARE; QUAREY. Pryce considers this to be the Cornish for a quarry of stones, a corruption from *quares*, joints. There are somewhat similar terms in Ireland; as a Connaughtman will say "there is no quarry" in a rock mass without joints.—*Coir*, plural *cora*, is an old term used by the famous Irish mason, Goban Saor.—*Cuir*, the verb, is, to place, to put, to build. *Cairthe* (pronounced *caire*) is a heap of stones or anything in layers. The French for quarry is *carriere*, from *carrer* to square, which equals the Latin *quadrare*.

DISH. The Lord of the soil's part of the ore raised—evidently similar to *duais*, a right, a due, a prince, a lord.

DIZZUE; DYHA. Probably from a similar root as that of the word *duais*.

DOAR; OAR. Probably similar to *odhar* (pronounced *ower*), virgin soil. According to Pryce, *oar* or *ore* is derived from *doar*, earth. *Dubh-ar* is black earth or soil.

DOL. Similar to the Irish *dail*, a divide, a share.

DURNS; DORN. Wooden frames to support weak ground in an adit. Probably similar to *dion*, to protect; as the *durns* protect the miners from danger while passing through the adit. Or it might have a connection with the Irish *dorn*, a fist.

ELVAN; HELVAN. Similar to *el* or *oil*, rock, and *ban*, white; the *b* changing into *v* on account of its position. The name evidently is derived from the white smooth weathering peculiar to Elvanyte and all other felsitic rocks, more especially when compared with the dark rough weathering of granite masses.

FLUCAN; FLOOCAN. Similar to *fliuchan*, a soft oozy, or miry moist substance, which is derived from the verb *fliuch*, to wet, to moisten.

FOGE. A forge or blowing house for smelting tin; Irish *fogaoth*, a small wind, a draught.

FORCQUE; FORK. See *Bottom in fork.*

GAD. Now used in Cornwall to signify a wedge; this however seems to be a corruption of the word, as in Ireland *gad* means a withe, or rope, of osiers or similar materials, used by smiths and quarrymen as handles for the wedge, to preserve their hands from being struck. Many of the ancient stone and bronze implements seem to have had "gads" for handles.

GAL; CAL; KAL. A whitish yellowish color, like that of cream.

GLIST. A shining black or brown mineral. Irish *glis* or *glus*, glittering.

GREUT; GRIT. Irish *groid* or *gruid*, grains.

GROUAN; GROWAN. Similar to *grothan* (pronounced *growan*), anything in small lumps or grains formed in a mass; its root being *groth* (pronounced *groh*) curds. "Tasenagrothan" is a common Irish expression for any substance of the character of curds or small lumps, that do not amalgamate, but each keeps separate although in the same mass. This word and granite evidently come from the same root, whether it is the Latin *granum*, the Irish *gran*, the Welch *graion*, or the Cornish *gronen*, which respectively mean "grain."

GUAG; GANGUE? Anything worthless. A foolish empty-headed man, in Irish, is called *guaga*. The term *gangue* may be connected with this word.

KAL. See *Gal*.

KAZER. A sieve. A similar word to *ceis* (pronounced *keis*), a wicker or basket-work sieve, on which potatoes or other vegetable food is placed to drain.

KERNED. A consolidated heap of mundic or copper ore. Seems to have a connection with *carn*, a heap not naturally formed but of an artificial nature; or it may be allied to *carnadh*, to pile, to heap up.

KIEVE. A val or large iron-bound tub in which ore is washed. Evidently similar to the word *keeve*, a large vessel, sometimes of wood, at other times of wickerwork.

LANDERS. Wooden pipes or troughs used for carrying water over hollows. Seems to be similar to *lantaoirs*, a partition, anything erected to cut off or divide.

LODE. Might possibly be from *luad*. This word has several meanings, one being anything that supports; as the framework of a roof supports the slates or the thatch. The supports, however, must be part of a whole, as the framework is part of the roof. A mineral vein in connection with its walls would be called a *luad*.

LOOBS. The Irish word is *laīb*, slime or hard mire. *Laīb* may also mean remnants or remains.

MEAT EARTH. This is described by Pryce as "Soil"; the superficial earth fit for agriculture. Meat seems to be similar to the Irish words *meith*, fat, luxuriant; or *masth*, soft, luxuriant.

MOOR. Probably similar to *mūir*, a shower, as a "moor of ore" signifies a quantity of ore in a particular part of a lode.

MUN. Any fusible metal. Irish *mian*, mine or metal.

Mundick; Mundic. Iron Pyrites. Perhaps similar to *mian*, metal, and *teach* or *tig*, dwelling, house, abode; that is, the house of the mine.

Nocking; Knocking. Breaking up ore. Apparently from a similar root as the Irish word *cnag*, to break.

Ore; Doar. See *Doar*.

Pen; Pedn; Pednan. The head of the buddle where tin is dressed. Seem to be similar to *ceann*, a head; as *p* in Welsh often corresponds to *c* in Irish. Pryce says the English of the word originally was "a head or promontory."

Podar. Formerly copper pyrites and all other ores except tin ore; now confined to mundic. Evidently similar to *putar*, rotten, corrupt; as Pryce gives a similar meaning for *podar*.

Pol-voz; Pot-voz. The wheel pit. Evidently from roots connected with *poul* a hole, and *roith*, a wheel. According to Pryce the word formerly was *Pol-roz*.

Pol-stean. A tin pit. Irish *poul*, a hole, and *stan*, tin; the latter being similar to *tain*, glittering.

Quere; Quarey. See *Cuare*.

Raf. Irish *raf;* poor.

Raffain. Of no value. Irish *raf*, poor; and *faon*, empty.

Ridar. A sieve, or riddle. Irish *riobhar*, and *reidhlan*, sieve.

Saller. A stage, or gallery. This may be the Cornish form of the Irish word *urlar*, a floor.

Scovan. A tin lode. *Sco* from *scoth* (pronounced *scō*), choice, best; and *van*, equalling *mian*, metal; a tin lode being considered better than all others.

Scove. Very rich tinstuff. Irish *scovs*, champion, much, many, or plenty. A very rich lode is called a "champion lode."

Shammel; Shamnel. A stage of boards used in old coffins before shafts were in common use. The term is now used for any stage of boards. Apparently similar to *samh*, a rest or bar put across anything.

Slottive. Dirty, slovenly, muddy. Irish *slaodaire*, a lazy or dirty person; or *sloitire*, a villanous person.

Slovan. The ancient name for an adit. May be similar to *slighe*, way, passage, and *vean* or *vin*, summit, or height. These words united would be pronounced *sleevin*.

Spal. Irish *spol*, a piece; or *speal*, to cut down; or *spral*, to make small pieces.

Spel. A similar word is in common use in Ireland, signifying to aid or help; such as, "a spel of work."

Squat. A bunch in a lode. Irish *scarth*, finest of anything; or *scoth*, essence of anything.

Stem; Stemmyn. A day's work. Seems to be a compound word from *Sdadh*, work; and *am*, time.

Strik; Streeck. To let a man down a shaft by a windlass. A word often used in Ireland is *stric*. If two men are carrying a handbarrow, and one becomes weary, he will say *stric*, that is, "put it down" or "let it down." *Strīoc*, "let it down," is the imperative of *strīocaim*, "I fall."

Takle; Tackle. Irish *tācla*; that part of a boat's gear which either elevates or lets down; running gear.

Teem. Irish *taom*, to pump out.

Tin. Perhaps from *tain*, glittering.

Toas. To clean and dress the wet tin. According to Pryce the word originally signified paste; it therefore is equivalent to the Irish word *taos*, dough.

Tol; Tollur. In Ireland, boundaries in many places are marked by holes bored in the ground; the person who makes the holes being called *Tollaire*, or *Tolloir*. *Toll* means to bore, while *poll*, equal to *tholl*, is a hole.

Tomals. *Tom* is a bunch, applied to corn, grass, or trees, when growing densely. *Tomavil* would express many of these together.

Troil. A feast. May have a connection with *truail* or *trail*, a kneading trough, as the miners could not feast or make merry until after the food was prepared.

Tut; Tut-work. By the lump. Apparently similar to *toid*, whole or entire, *i.e.*, in the lump; the miners bargaining to take out the whole of the ore at one price.

Tye. Similar to *tiugh*, thick.

Vooga. Apparently similar to *fāg*, a hollow, or rather matter elevated to form a hollow, such as the hollows between waves of the sea or the hollows in a cloud of smoke. Pryce gives a similar meaning for the Cornish word.

IV.—*Chronicles of Cornish Saints.*

VI.—S. Burian.

By the Reverend John Adams, M.A., *Vicar of Stockcross, Berks.*

Read at the Spring Meeting, May 18, 1872.

In an old English Martyrology, published in the year 1608, we have the following account of this Saint:—"May 29th, at S. Buriens, in Cornwall, the commemoration of S. Burien, Virgin, who being an Irish woman of great nobility by birth, came over into England and lived a most virtuous and godly life for many years in Cornwall, where in very great sanctimony and working of miracles, she finally gave up her soule to her heavenly spouse. Her memory is very famous, even until this day in our Island of Great Brittany, especially among the Cornishmen, where there is a towne and port of her name in the Cape or Promont of Cornwall, commonly called S. Buriens, where also in tymes past hath byn a famous Church erected in her honour."

The above notice contains all the information that is current concerning S. Burian; but a little research enables us to add some interesting details to this scanty outline of her life.

In the Martyrology of Donegal, under May 29th, S. Burian's feast-day, we find, instead of her name, that of "Briuinseach Cael, Virgin, daughter of Crimhthann of Magh-Trea"; and in the Table of the Martyrology, at the same date, "Bruinsech the slender," with the following note appended to her name: "St. Buriena, a Virgin of Ireland, is venerated in a town bearing her name in England on the 29th of May. Is she not this Bruinseach"? The similarity of the names, coupled with the fact that where we might expect to find Burian, Bruinsech is given in the Irish Martyrology, makes it extremely probable that they designate one and the same person. Moreover, Leland tells us that Bruinet, a King's daughter, came into Cornwall with St. Piran; this Bruinet,

in the opinion of Whitaker,* being identical with Burian; and in one of the Lives of St. Piran, we find an account of a certain holy woman called Bruinecha, who is conjectured by Colgan to be identical with Bruinsecha, and is no doubt the Bruinet mentioned by Leland. Hence we may I think assume, without hesitation, that the name by which Burian was known in her native land was Bruinecha, *alias* Bruinsecha; and that she is the person concerning whom there is a legendary narrative in the life of S. Piran which may be thus paraphrased:—"The mother of Piran, who had become a faithful Christian and a holy servant of God, through the instrumentality of her son, wished to reside with him, so he built for her an abode not far from his cell; and she dwelt there with a community of devout women, whom she had gathered around her; amongst them was a certain virgin exceedingly fair, Bruinecha by name, the daughter of a chieftain; and the holy mother of Piran loved her deeply, because she was her foster-child, and also because she was beautiful in character as well as in person But the chief of the country of Hua Fiack, whose name was Dymna, having heard the fame of the virgin's beauty, came with his soldiers and carried her by force from her cell. Many days he kept her imprisoned in his castle, and her beauty fascinated him. Then Piran arose and came to Dymna, to demand his sister; but on no account, nor by any persuasion, could the chief be induced to give her up. "Never," said he in derision, "will I let her go, unless to-morrow at day-dawn a swan shall rouse me from sleep"! It was then the dead of winter, and in the night there was a great fall of snow, but not a flake fell where the man of God and his companions tarried. When the morning dawned, behold upon every turret of the chieftain's castle a swan was perched, uttering plaintive cries! The tyrant in alarm arose, hurried to the saint, prostrated himself before him, and dismissed the damsel."†

Subsequently, however, being unable to conquer his violent passion, he resolves again to seize and carry her off; but the maiden swoons away and dies as soon as she is aware of his approach; and so his evil purpose is frustrated. Then follows an account of his raging grief, succeeded by sudden misfortunes,

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* *Cathedral of Cnrnwall*, vol. i, p. 25.

† *Colgan. Acta Sanctorum Hiberniæ*, vol. i, 459.

which bring him to a better mind; the narrative of course being embellished here and there with a touch of the supernatural. The upshot of the story is that Bruinecha revives, and that her restoration is attributed to the intercession of S. Piran, who, believing that the chief will never again resort to violence, enters her chamber and prays that her life may return.

Now in this legend, which in its outline at all events we may regard as a statement of what actually took place, though it abounds with fables characteristic of the age in which it was written, we have a glimpse of the life of S. Burian prior to her landing on our shores; and the Cornish tradition that she was a chieftain's daughter, and a companion of S. Piran, is in perfect harmony with the narrative. Her parents were probably Pagans, and died whilst she was an infant; otherwise she would hardly have been consigned to the care of Piran's mother, who was not a convert to Christianity until late in life. It was at the time when the old heathen superstitions of Ireland were beginning to quail before the zeal of S. Patrick and his fellow-labourers; and Piran seems to have embraced the new faith in early life. No other member of his family, however, appears to have followed his example for many years. Certainly it was not until he had been called to the work of the ministry, and was a recognized coadjutor of the great Irish Apostle, that his mother was baptized; and as her conversion, we are told in the passage above quoted, was owing to his instrumentality, so also we may infer was that of his foster-sister Burian, who must often have listened to his teaching.

We find nothing more concerning the damsel in the life of S. Piran; but we may be sure that when he migrated into Cornwall soon afterwards with his companions, he did not abandon his helpless sister to the perils which encompassed her. Even if tradition had been silent respecting the king's daughter that accompanied him, we should say that he could not have left Bruinsecha behind him. May we not rather suppose that he sought a new and distant field of labour mainly for her sake, and to place her beyond the reach of further violence?

Nothing has been recorded of S. Burian's life and labours in Cornwall, except the general tradition that she spent her days in good works and great sanctity; but the place where she dwelt was regarded as holy ground for centuries, and can still be pointed out.

It lies about a mile south-east of the Parish Church which bears her name, beside a rivulet on the farm of Bosliven, and the spot is called the "Sentry" or Sanctuary. The crumbling remains of an ancient structure still remain there, and traces of extensive foundations have been found adjoining them. If not the actual ruins, they probably occupy the site of the oratory in which Athelstan, after vanquishing the last Cornish king, knelt at the shrine of the Saint, and made his memorable vow, that, if God would crown his expedition to the Scilly Islands with success, he would on his return build and endow there a Church and College in token of his gratitude, and in memory of his victories.* It was on that wild headland, about four miles from Land's End, that S. Burian took up her abode; and a group of Saints from Ireland, who were probably her friends and companions, and who seem to have landed on our shores at the same time, occupied contiguous parts of the same district. There she watched and prayed with such devotion that the fame of her goodness found its way back to her native land; and thenceforward Bruinsecha the beautiful, by which designation she had been known there, was enrolled in the catalogue of Irish Saints; but her Christian zeal was spent in the Cornish Parish which perpetuates her name.

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* "S. Buriana, an Holy Woman of Ireland, sumtyme dwellid in this place, and there made an oratory. King Ethelstane goying hens, as it is said, onto Sylley and returning made *ex voto* a College wher the oratorie was." *Leland Itin.*, iii, fol. 5.

V.—*Some Remarks on the Fairies and Giants of Cornwall.*—*By* William Sandys, F.S.A.

MANY of the Legends of Fairies and Giants are now considered to be derived from the earliest ages of mankind; indeed, before the dispersion after the flood. Thus is accounted for the striking similarity between many of them, among the various descendants of the Aryan race, as the Hindoos, Persians, Celts, Greeks, Romans, Slavonians, &c., modified, by lapse of time and otherwise, from the originals.

In the Northern Mythology, Höd, who was blind, was persuaded by Loki who guided his hand, to throw a wand of mistletoe at Baldur, who was impervious to everything else, and was thus killed. There is a similar legend in one of our old Mysteries, where Lamech, who is blind, is guided by his servant to throw a dart at a supposed beast in the bush; this proves to be Cain, who is thus killed.

Whittington and his Cat have their counterparts in Persia; and in Italy, the tale is told of one Ansaldo degli Ormanni. Puss in Boots has a companion in Le Chat Botté of Straparola, and in the story of Lord Peter in Dasent's Popular Tales. His cat is an enchanted Princess, who is restored on having her head cut off—like the White Cat in that fairy tale—and is married to Peter. In the Pentamerone (1637) Gagliuso promises his valuable cat a golden coffin; but the sagacious animal suspects him, and, feigning to be dead, is about to be thrown out of window, when she rises, and Gagliuso is properly reduced to his former poverty.—There are several stories in different countries, similar to Cinderella; and even our old nursery tale of the Little Old Woman cut shorter, who relied on being recognised by her little dog if she had not been changed, has its companion among the Norse Tales, where a foolish woman goes to market to sell a cow, but is cheated by a roguish butcher, who makes her drunk, dips her in a tar-barrel, and rolls her in feathers. She gets confused about her own identity, but says that if on her return home her little dog Tray

does not bark at her, it must be herself. Unluckily Tray does bark at her, and she begins to think she is some large outlandish bird.

The Elves of the Northern Nations, the Brownies of Scotland, and Pixies or Piskies of the West of England, and all of the same class, are derived from one common early source. There is a singular old legend respecting their origin, where, by a curious anachronism, the children of Eve are examined in the catechism, and Abel repeats something like the Lord's Prayer. The Almighty visited Adam and Eve after the Fall; and at the time, Eve was washing her children, but had only finished with some of them, and brought those only to the Lord, being ashamed to shew the others. On being asked if she had any more, she replied, she had none, on which God said, "What man hides from God, God will hide from man." The unwashed children then became invisible, and took up their abode in hills, rocks, &c., and from them are descended the elves, trolls, and such like, while mankind sprung from the washed children.

Some of these elves occasionally made themselves useful in a house, but were rather fanciful. They would clean up at night, and even thresh corn, and would take any mild refreshment left in their way; but any articles of clothing seemed to drive them off. One of the tribe called Kaboutermanneken, suppossed to reside in some part of Germany, frequented the house of a miller, who found his work was carefully performed at night, and left out bread and butter, of which the little fellow partook. So the miller watched to see what his lodger was like, and observed he was stark naked. He resolved to make him a little jacket and trowsers, and left them in his way, looking for the result. The manneken seemed much pleased, put on his new attire, and danced out, but was never seen afterwards. This is like Hunt's *Tale of the Piskie Threshers*, and there is one, somewhat similar, in Grimm's curious collection of Tales.

The Fairies are generally considered to have been of small size, though not invariably so. Some of them were benevolent, and handsome, and but few were privileged to see them; others were malignant, old, and ugly. All were endowed with superhuman power.

We do not find any notice of the Piskies in the early histories of Cornwall. Our particular accounts are those of Anne Jefferies,

in the first half of the 17th Century; and the Lost Child, Johns, of Trevalsa, St. Allen, in June, 1684, related by Hals, and by Hunt.

Some of the fairies were desirous of having a human nurse for their children, who were generally ill-mannered, morose, and ill-looking, and, instead of being children, frequently of great age, although of infantile size, and were secretly changed for the healthy child of the nurse. The unfortunate mother whose child was so exchanged, was grieved at the sudden sulkiness and ill-conduct of the changeling, but could not guess at the truth, until informed of it by some intelligent friend, who generally recommended some stringent proof.

There are stories of these changelings in many countries, all shewing a common origin. Mr. Hunt, in his interesting *Romances of the West of England*, gives an amusing one in verse. "The Spriggan's Child," who, although an infant in size, was a married man with a family, hears a strange voice cry out, "Tredrill, Tredrill! thy wife and children greet thee well." Notwithstanding this greeting, however, he declines to go back, until he has been well beaten on the ash-pile before the door. In the Iceland story, the mother, under the advice of a wise woman, sets a cauldron in the middle of the hearth, and fastens a number of rods together with a porridge spoon at the end, and sticks them into the cauldron with the end up the chimney. "Well," says the changeling, "I am old enough, as any one may guess from my beard, and the father of eighteen children, but never in all my life have I seen so long a spoon, to so small a pot." The mother rushes at him, and begins to beat him unmercifully, when a woman enters with the real child in her arms, and says, "See, how we differ; I cherish and love your son, while you abuse and ill-treat my husband"; with whom she then departs, leaving the child.

The general plan was to excite the wonder of the changeling by some strange operation. Our late friend Crofton Croker, in his valuable *Fairy Legends of the South of Ireland*, tells how Mrs. Sullivan had a fine healthy, blue-eyed boy, changed for a shrivelled little thing, always squalling, which she thought might arise from disease. She consults Ellen Leah, a cunning old dame, who advises her to take a big pot of water and boil it, and place a dozen egg-shells in it, when if the child was a changeling, he would betray

himself in some way, and if so to cram a red hot poker down his throat. When Mrs. Sullivan was in the midst of her cookery, the child asks, with the voice of an old man, "What are you doing, Mama." "Brewing a vick," says Mrs. Sullivan. "What are you brewing, Mama?" "Egg-shells a vick." "Oh"! shrieked the imp, starting up, "I'm fifteen hundred years in the world, and I never saw a brewery of egg-shells before." Up ran Mrs. Sullivan with the poker, but in her hurry fell, and on her recovery found her own child sleeping quietly in the cradle. In a legend of Bretagne, the mother, under the advice of the Virgin Mary, pretends to be preparing something in an egg-shell, when the changeling asks what she is doing; she answers that she is preparing dinner in an egg-shell for ten laborers. "Ah," says he, "I have seen a great many curious things, but never saw the dinner for ten laborers contained in an egg-shell." The mother proceeds to give him a sound beating, when some of his people come in to fetch him, and restore the real child. In one case a black pudding was the test. The adviser here was a sharp girl, and the changeling was an enormous eater. She killed a pig, and made of it, hide, hair, and all, a huge black pudding, and set it before him. He began to eat voraciously, but after a time relaxed, as most people would have done in a similar case, and remarked, "A pudding with hide! and a pudding with hair! a pudding with eyes! and a pudding with legs in it! Well, three times have I seen a young wood grow up, but never did see such a pudding as this! the devil himself may stay now for me." So saying he ran off.

Sometimes the nurse was taken to the abode of the fairy, and they were generally intrusted with an ointment to rub the child's eye with, but emphatically warned against using it themselves. As a matter of course they did so, and at first were much delighted to find that they were enabled to see fairy dwellings and fairy matters, and on their return home, after their labours were finished, to recognize fairies, when unseen by other people. This advantage however did not last long, for when the trick was discovered, the offender was generally punished with the loss of an eye or perhaps of both. Hunt gives several of these nursing stories, and they are to be found in Keightley's interesting *Fairy Mythology*, and in numerous works relating to Legends and Traditions, as far back as Gervase of Tilbury of the 12th century. The usual finish is, that

the nurse, by virtue of the ointment, recognizes a fairy man at some market, probably pilfering, and on accosting him, and being asked with which eye she sees him, on her answer is deprived of the sight of it.

We have some materials for the History of Giants in Cornwall. They are mentioned in the earliest records connected with the County—Domesday Book, however, not condescending to notice them. Carew quotes from Camden, Havillan, a poet of the 12th century, who refers to the Titanic race in the county. Gogmagog, their leader at the time of the landing of Brutus, was 18 feet high, but was thrown by Corinæus, who did not much exceed the human stature, and then became Duke of Cornwall. Geoffrey of Monmouth says, that the oracle told Brutus in his early days, his future success, referring to a land of giants, thus :—

Brute, sub occasum solis, trans Gallica regna,
Insula in oceano est undique clausa mari.
Insula in oceano est habitata gigantibus olim,
Nunc deserta quidem, gentibus apta tuis.

There was a belief in the time of Saxo Grammaticus (12th Century) that the earliest human beings were of great size and power, being Ymir, the evil spirit, and his offspring. They were succeeded by others of less size, but greater sagacity, who overthrew their predecessors by means of sorcery. These last were Odin and his kindred, who had the reputation of gods. After them came others of less bulk, who became the priests of the gods.

Whether the Druids had anything to do with the early giants is very problematical. Borlase attributes the Cromlechs and most of the antiquities in Cornwall to them, and has been followed by others; but this is now doubted, if not disproved. They indeed selected groves of oaks for their sacred rites, while the Cromlechs, wherever they have been examined, appear to have been places of burial; and there are fewer of these monuments in Britain where the Druids are said to have flourished, than in Armorica, Scandinavia, and Algeria, and the East, where they were not known. But this question would require to be treated of by itself.

One of the principal heroes connected with giant history, is that popular character, Jack the giant-killer, however he may be called. In the Northern Tales, a character called Boots is introduced, generally the younger son in a poor family, and a sort of

male Cinderella; but when at last he comes in contact with a giant or troll, he outmanœuvres and destroys him, somewhat in the style of Jack. There is Boots who ate a match with the Troll. He is the younger son of a poor farmer, and, going out to cut wood, meets a giant who threatens him, but he is not to be frightened, for, having a new-made cheese with him, he squeezes out the whey, and tells his opponent that if he is not quiet, he will squeeze the water from him as he does from that stone. The Troll then becomes civil, and cuts a quantity of timber for him, and then takes him home for refreshment, where they feast on a huge pot of porridge, and Boots proposes to eat, for a match. The cunning fellow privily hangs his bag before him, into which he ladles most of his share; and after a while, in order to make room, as he says, cuts it open and lets the porridge out, recommending the Troll to do the same, which he stupidly does, and thus destroys himself, and Boots takes possession of his treasure. In one tale the hero is called the Herd Boy. He squeezes the cheese, and plays some other tricks, and at night suspecting the giant wants to kill him, places a churn in his bed which the giant smashes with a club, and is much astonished in the morning to see the youth quite sound but complaining that a flea had bitten him in the night. The eating-match then takes place, ending as before. This, and other escapes from the club of the giant, one as distant as Persia, in the story of Ahmed of Isfahan and the stupid Goole, have a similarity to the adventures of the Scandinavian god Thor, him self no mean giant, with the giant Skrymir. Thor and his companions pass the night in a spacious house with a broad entrance, which is claimed in the morning by Skrymir as his glove. They all travel together till night, when Skrymir lays down to sleep. Thor, who is here the aggressor, at three several times in the night, strikes him with his mystic hammer. Skrymir, however, only complains that a leaf, or an acorn, had fallen on him, but he was a magician, and the blows were given on a rock, in which they made deep indentations.

In the Norse tale of the Giant who had no Heart, Boots, who gets into his house, is hidden three times under his bed, the giant exclaiming each time, "What a smell of Christian blood is here." He is ultimately overcome by Boots, after some hazardous adventures, and hairbreadth escapes. Something like this cry for blood,

occurs in one of the Zulu tales; the Zulus being a Kafir race in the East of Africa, and unconnected with the Aryan races. Usikulumi, a young Zulu, is courting two daughters of a female cannibal called Uzembeni, (double courtship being apparently allowable among the Zulus). She comes in while he is in the house, and the daughters hide him. The old woman cries out that she smells fresh meat and she must have it. The young Zulu contrives to escape safely with the two daughters.

In giant districts, memorials of their strength and prowess are constantly marked out, as, in the West of Cornwall, the Giant's Chair, the Giant's Table, &c., and also huge stones either dropped as those by Cormelian the wife of Cormoran, when they were building their house on St. Michael's Mount, of which the Chapel Rock remains as proof: or thrown about in sport, as by the giants at Trecobben, or at each other in anger, as at St. Kevern and St. Just. There is an example in the North where Balderick who lived in the Isle of Rugen in the Baltic, wished to avoid wading through the sea when he went to Pomerania. He filled his apron therefore with earth to make a causeway to the mainland. As he proceeded, holes were torn in his apron, and from the earth that fell through were first formed the Nine Hills, afterwards the principal residence of the dwarfs, and next thirteen little hills. He then threw in the remainder which formed the Hook of Prosnitz and the little peninsula of Drigge, but a gap still remained, which so annoyed him that he died in a fit, and the causeway was never finished.

Our Cornish Giants, Bolster and Trebiggan, were of enormous size, but even they have their counterparts. When the Giant Hrungnir fought Thor, his companions made a man of clay called Mockurkalfi, nine miles high and three broad, placing a mares-heart in him to assist him. But it had no courage and became an easy victim to Thialfi, the companion of Thor, while Hrungnir was crushed after fighting valiantly. Trebiggan is said to have taken men out of ships passing the Land's End, but is beaten by Micromegas, an inhabitant of Sirius, as described by Voltaire. He was 8 miles high, and with an inhabitant of Saturn visited the earth, where he was surprised at the smallness of everything. He hooked up a whale out of the Arctic Sea with his little finger, and seeing something floating, which proved to be a ship, took it out

gently with two fingers, and at last discovered living creatures in it. A German ballad, called Reisen-Spielzeug, mentions a pretty little giantess who picks up a peasant with his plough and yoke of oxen, and takes them home to her father, as a plaything; but he rebukes her and tells her that the race of the creature she has brought home, will ultimately drive the giant race away.

Bolster, however, and giants of that size who would reach from Truro to Falmouth, are too large to romance about; we cannot realize them. One of Brobdingnagian size we can fancy; but much beyond that we get confused.

VI.—*On the Original Use of the Mên-an-tol, or Holed-Stone, in the Parish of Madron, Cornwall.*—*By* E. H. Wise Dunkin.

Read at the Spring Meeting, May 18, 1872.

THE curious perforated stone, called the Mên-an-tol, which lies on the moors about a mile north of the Lanyon Cromlech, has been frequently described;* but no one appears to have ever satisfactorily explained the use to which it was originally applied.

It will be admitted, I presume, *nemine dissentiente*, that the superstitious practice of crawling through the orifice to ensure the removal of rheumatic pains and spinal diseases, though commonly believed to be an effectual remedy in Borlase's days, and even in the present century by some of the more credulous, has no connection whatever with the primary object for which this stone was erected. Various theories have, therefore, been started from time to time, in endeavouring to explain the real use of the Mên-an-tol. Some have conceived it to be a kind of dial for determining the times of recurrence of certain festive seasons; others that it was a place where victims intended for Druidic sacrifices were bound, before they were led to the holocaust; and others again, that it was used in the performance of public games.

It seems, however, far more reasonable to suppose that the Mên-an-tol is nothing more than a remnant of some ancient *sepulchral* monument. This was evidently the opinion of Mr. J. Y. Akerman, who, in his *Archæological Index*, says it may possibly be the remains of a very large cromlech; and more recently Mr. J. O. Halliwell has expressed his belief in the sepulchral character of this and similar stones.† Of the correctness of this supposition I think there can be little or no doubt, but it yet remains to be shown to what part of the sepulchral monument this perforated stone belonged, and for what purpose it was there placed. These

* The following references may prove useful—Borlase's *Antiquities*, p. 177; *Gentleman's Magazine*, April, 1864, p. 444; Edmonds's *Land's End District*, p. 19; Halliwell's *Rambles in Western Cornwall*, p. 92; *Archæologia Cambrensis*, 3rd Series, vol. x, p. 292.

† *Rambles in Western Cornwall*, p. 93.

are points I shall now endeavour to explain; but before doing so, it will be well, for the sake of those who cannot call to mind what the Mên-an-tol is like, to say a few words descriptive of its appearance.

It consists of an octangular-fashioned stone, of a laminar shape, standing upright on its edge. The part above the surface measures about three feet five inches in height, and it is on the average about ten inches thick. The broad face of the stone is perforated by a large circular hole, one foot seven inches in diameter on the west side, and splayed outwardly so as to measure two feet three inches on the opposite face. On each side of this orifice, at a distance of about eight feet, stands an upright stone, and a few other stones may be seen lying in the vicinity. The whole group presents the appearance of the remains of some dilapidated structure.

The examination of the contents and construction of ancient gravemounds by some of our leading antiquaries, has made known two or three instances of *tolmên-entrances* in connection with chambered tumuli. These entrances are formed by a couple of stones, placed together with the inner edges of each cut away in the centre, or by a large perforation in a single stone. It will not be necessary to speak here in detail of the circular holes sometimes occurring in the side-stones of cromlechs, as these orifices, with a few exceptions, cannot be called entrance-holes, inasmuch as their size prevents the passage of anything larger than a man's arm through them. Some holes in cromlech slabs have, however, a greater diameter, and in such cases they no doubt illustrate the subject in hand. But the *tolmên-entrances*, to which I would particularly refer, are those which have been noticed during the examination of certain chambered long barrows at Avening and Rodmarton in Gloucestershire, and at Kerlescant in Brittany.* In each barrow an entrance had been formed, by cutting away a portion of two contiguous walling stones, so as to make an oval orifice sufficiently large to enable a man to creep through. The object of these

* *Archæologia*, vol. xvi, p. 362; Lysons' *British Ancestors*, p. 141; *Journal British Archæological Association*, vol. xxiv, p. 41. Another example of a tolmên-entrance may be seen in Plas Newydd Park, Anglesea, and is described by the Hon. W. O. Stanley, in the *Archæologia Cambrensis*, 4th Series, vol. i, p. 51.

apertures was evidently to facilitate the deposit of successive interments within the respective chambers, without disturbing, to any great extent, the covering earthen mounds. The same idea seems to be exemplified in the Trethevy Cromlech, near Liskeard, a *square-shaped* opening having been cut in one of the side-stones, by means of which the chamber could be easily entered before the interior was blocked up with a stone which has fallen inwards.*

Now with regard to the Mên-an-tol, I believe it had a similar use to the stones at Avening and Rodmarton, and that it served as an entrance-stone to a sepulchral chamber that once stood on its present site; and, further, that the hole was made solely for the purpose of enabling anyone to enter the kist or chamber, when fresh burials took place, without interfering with the general stability of the structure. It is to be regretted that the greater number of the stones composing the original kist seem to have been removed many centuries ago; and hence it is impossible, at the present time, to ascertain with certainty the dimensions, or plan, of this chamber-mound. But notwithstanding this, there are sufficient traces of the original structure remaining, to enable the archæologist to comprehend how the Mên-an-tol could have been used as a tolmên-entrance, in the same way as the tolmên stones which have been found as integral parts of ancient chambered barrows. In position and shape, the Mên-an-tol, it should be remembered, does not resemble the smaller holed-stones in the same district; but the hole is close to the ground, a convenient and suitable position for an orifice intended to serve as a means of access into an interior compartment.

This, as I have before observed, seems to me to have been the original use of the Mên-an-tol; and although the idea may not be immediately received with credence by local antiquaries, I feel confident that in the end they will arrive at a very similar conclusion after a careful study of the question. Let me, as a final remark, express an earnest hope that this valuable relic of a præhistoric past will not be allowed to be destroyed for want of due protection, which is so essential in these days, in order to prevent any sudden mishap befalling ancient objects of this kind.

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* The circular hole in the capstone of the Trethevy Cromlech must obviously have been made for an entirely different purpose.

VII.—*Two Old Mining Patents.—By* R. N. Worth, *Plymouth, Corresponding Member of the Institution.*

Read at the Spring Meeting, May 18, 1872.

A LIMITED acquaintance with the history of Cornish mining is sufficient to enable us to recognise the fact that at a very early period it was deemed a most important industry, to be fostered heedfully by those who had the power. Undoubtedly the means taken to promote its success were not always those which would approve themselves to our modern ideas, but the object was mostly unexceptionable. During the sixteenth century a great advance took place in the practice of the arts and sciences in this country, due in the main to an impulse from the Continent, given by the scholars and artificers of France and the Low Countries, who fled therefrom and took asylum in England to escape religious persecution. To this date, then, there is no reason to doubt, many improvements in our mining and metallurgical processes are traceable. As a rule, our monarchs were quite alive to the expediency of encouraging skilful foreigners to settle in this country, and Elizabeth was not one whit behind any of her predecessors. There are extant a number of patents granted by her to miners from the Continent, giving them powers, under certain conditions, to search for metalliferous ores in various parts of the kingdom, generally exclusive of the Stannaries. Of the incorporations thus created, the most important appears to have been one known as the Battery Company, which seems to have worked with a certain degree of success.

Recently, in searching the MSS. in the British Museum for matters relating to Cornish mining, I lighted upon one of these patents (in the Lansdowne MS.) which has reference to Cornwall, an abstract whereof will, I hope, not prove unacceptable to this Institution. It is dated 1575, and entitled "Articles for the Mining Corporation."

It sets out by authorising Thomas Shurland and his company and Sebastian Spedel and his company to "bryng into this realm at divers tymes so many Dutch arts (artificers) and workmen for mynes, not exceeding in all the number of 300" as they may require; and with them and English workmen to "serch and dig all maner of myndes as they shall find" in the several counties of the kingdom, including Cornwall. Authority was also given to them to take as many English apprentices as they might desire, with the consent of their parents; and to make "ordenances" to keep their workmen in subjection, so that these "ordenances" be not against the laws of the realm. It was likewise agreed that Shurland and Spedel might have all manner of tools, necessaries, and victuals, at fair and reasonable prices, and that they should bring into the country what they required, and their workmen, without paying custom or subsidy. They were further to have liberty to take such wood as they needed for building and like purposes from the Queen's woods free of charge. Wood for "melting and burning" they were to buy, paying for the same at a price fixed by four honest men, such price not exceeding the ordinary figure. Surface damage was provided for by declaring that land which belonged to private lords should be "praysed by foure honeste men, two appointed by the tenaunte, and two by the myners, not being of their company or straungers, and to paye out of hand only so much as they shall say, conditionally that none shall be valued double price that corn, meadow, or wood ground be worth about the same place."

In return for these concessions the miners agreed to pay the twentieth dish of ore to the Queen, but not before the expiration of three years from the commencement of the works, in order to give time for their development. To this there was a qualification, which curiously illustrates at once the shrewdness and what we may call the scientific innocence of the Queen's advisers and the equal innocence of the miners themselves. "But yf," say the

latter, "we fynde any myne of precyous stones, perle, golde, and silver, to begin to pay presently after finding the same." The Queen's share of these matters was to be a tenth, and the remaining nine-tenths of the precious stones and perles—when they got them—the Queen was either to buy at a fair valuation, or let them carry away. The nine-tenths of the gold and silver were to be bought by her Majesty at mint prices.

The Queen's dish of the ordinary metals was to be "molten and purged for her Majestie by our workmen at our charges and travaille, on condition that her Majesty finds the wode and coles and heade, as moche as we shall nede the same, and all that we may compound with her Majestie to bye the same at a reasonable price." As to the rest of the copper the Queen was to have as much as she wanted at the price any other person would give, and to let the patentees carry away the remainder at a reasonable custom. All other metals they were to be at liberty to carry away on paying only the ordinary custom.

The concluding clauses of the articles are strictly in the nature of an ordinary patent of modern days, and show what importance Shurland and Spedel attached to their technical knowledge. The Queen agrees with them "that within 20 years after date hereof no man or person of this realm shall make or cause to be made in any country such instrument" as they should devise for the use of the corporation "if the like have not beforehand been made in this realm," on penalty of a fine of £200, of which half was to go to the Queen and half to the corporation. For imitating any of their smelting or roasting processes, the fine was to be £500.

There is another MS. relating to Cornish mining, of nearly the same date, contained in the Cottonian collection [Titus, B. III.], to which I may also briefly direct attention. It is headed "Order with regard to Blok Tinne;" but might, with stricter propriety, be called "Caution to Smelters." The occasion of the order was the prevalent adulteration of the white tin; "for that there was oftentymes putt into the same many pece of iron, with cinders, stone, and such like, to the great slaunder and discredit of the said realme, and to the manifeste deceipte of straungers beyond the seas." In order to avoid this, it was first suggested that the blocks should be re-melted into "strake or barres." However, it was found that this led to "a far greater decept." "The merchaunts

do melt the same, supposing thereby to avoid the slaunder and to blind the world; and to every hundredweight of tin put 30 lbs. of lead—sometimes more." Therefore it was ordered that Sir Francis Walsingham should have a twenty-one years' lease for trying, melting, and casting, in order that either kind of fraud might be prevented. It is but fair to the Elizabethan smelters, however, to state that they were not the only black sheep in the tin trade in those days. Another of the Cottonian MSS. [Julius, F. 6], on the "Pre-emption of tin," bitterly assails the tin farmers, declaring that they themselves became merchants "and pretend a scarcity of tinn, and themselves stopp the vent of purpose to keep up the price in forraine countries." So much for interfering with the natural course of trade.

VIII.—*Quantities of Pilchards exported from Cornwall, and prices at which they were sold; from* 1815 *to* 1871. *By* WILLIAM ROBERTS, *Penzance.*

Read at the Spring Meeting, May 18, 1872.

THE following columns have been compiled from accounts kept by Messrs. Bolitho, of Chyandour :—

Date.	Quantity.	Price.
1815	15,000 Hhds.	100/ to 102/
1816	20,000 „	49/
1817	24,000 „	60/ to 70/
1818	1,700 „	73/
1819	2,900 „	52/ to 62/
1820	800 „	55/ „ 84/
1821	2,000 „	72/
1822	9,123 „	60/ to 80/
1823	24,109 „	52/ „ 84/
1824	7,611 „	52/ „ 57/
1825	12,651 „	55/6
1826	10,670 „	34/ to 50/
1827	5,238 „	58/ „ 67/6
1828	26,018 „	38/6 „ 45/6
1829	700 „	
1830	22,010 „	32/ „ 35/
1831	26,648 „	35/ „ 38/
1832	31,930 „	26/ „ 45/
1833	10,042 „	50/
1834	25,295 „	32/ to 56/
1835	23,833 „	35/ „ 40/
1836	18,762 „	34/ „ 44/
1837	15,349 „	40/ „ 42/
1838	7,580 „	51/ „ 62/
1839	12,856½ „	47/ „ 52/
1840	23,364 „	50/ „ 78/

Date.	Quantity.	Price.
1841	9,604½ Hhds.	46/ „ 50/
1842	20,735½ „	37/ „ 40/
1843	8,859½ „	43/ „ 59/6
1844	13,967½ „	45/ „ 55/
1845	30,807½ „	40/ „ 54/6
1846	34,137 „	30/ „ 38/
1847	41,623 „	30/ „ 36/6
1848	7,593 „	37/ „ 63/
1849	25,588 „	44/ „ 55/
1850	25,823 „	44/ 55/ to 60/
1851	26,743 „	43/6 to 45/
1852	15,141½ „	30/ „ 50/
1853	21,275 „	36/ „ 42/
1854	6,704 „	37/ „ 50/
1855	6,102 „	42/ 54/ 70/ to 75/
1856	18,333 „	40/ to 51/
1857	15,915 „	42/
1858	18,479 „	60/ 50/ to 47/
1859	3,145 „	52/6 to 73/
1860	3,920½ „	60/ „ 80/
1861	10,988½ „	68/6 „ 72/6
1862	17,807½ „	51/ „ 63/
1863	26,057½ „	53/ 46/ 45/ to 41/
1864	22,539½ „	46/ to 55/
1865	9,929 „	57/ „ 79/
1866	14,294 „	57/ „ 63/
1867	15,832½ „	60/ „ 63/
1868	19,998 „	59/ „ 68/
1869	15,139 „	64/ „ 72/
1870	6,057½ „	64/ „ 92/
1871	45,682* „	68/ 52/ 40/ 37/ to 25/

Total .....export during 57 years, 399,087 Hhds.
Average Annual ..... „ „ 16,474 „

* To this must be added 1,550 Hhds. not shipped in 1871.

IX.—*Notes on the Ornithology of Cornwall, for the year* 1872–3.– *By* E. Hearle Rodd, *Penzance.*

In looking over the pages of the "Zoologist" for the last year, where I have been in the habit of recording any fact of interest occurring in the ornithological history of our county, I do not see anything that deserves much attention,—certainly no new species has come under my notice; nor do I see any record, from any other naturalist, of any great importance.

It may be well to notice, as a point of interest, that occasionally we are visited, abruptly and without any apparent specific cause, by birds hitherto extremely rare and almost unknown in this district, and which are common enough throughout Britain and even in the eastern parts of the county. This is the case with our common Green Woodpecker, so well known elsewhere, but of which only one or two examples, over a period of nearly half a century, have come under my notice as having appeared in the Land's End district; but, during the last year, I happen to know of several being dispersed over the district, and, unfortunately, some were killed. I believe that the Woodpecker has been seen, not unfrequently, in the large woods at Tregothnan, and at other woodland places in the neighbourhood of Truro; and what I have stated in reference to their appearance in this district during the past year, appears to have full confirmation by the increased numbers in your neighbourhood, no less than seven having been seen together at Bosvigo, according to a paragraph which I read in a daily paper. The Green Woodpecker is well known in the large woodlands in the eastern part of the county. There also (although more local) may be seen the two other common species, viz., the Greater and the Lesser Spotted Woodpeckers; all three species breed annually in the woods at Trebartha.

I continue to receive accounts of the general distribution of one of the most beautiful of our resident Warblers, the Dartford Warbler,—a species which, formerly, was only occasionally, and at uncertain intervals, seen in the county, and was almost unknown in the West of Cornwall. Who will say, after this, that we may

not be visited by other British species hitherto unknown to us; and, amongst them, the Nightingale? There are localities in your neighbourhood exactly adapted to their habits and economy; and you need go no farther west than Bosvigo, nor east than Tremorvah, to be sure of hearing their wonderful powers of voice, if they should condescend to honour Truro by their presence.

We have been visited by unusual numbers of two of our rarer white-winged Gulls, viz., the Glaucous and the Iceland Gulls. These are distinguished by their wings being entirely white, whilst all the other species on our coasts, except the Ivory Gull, have the tips black.

The only other marine bird of interest that I have noted in the past year is a good specimen, in its summer plumage, of the Gull-billed Tern, a rare British species, and one of comparatively recent discovery. It is an interesting species, showing an intermediate and connecting link between the Gulls and Terns. It has occurred in Cornwall, only in a few instances; and one of these was on the Scilly Isles.

All our winter visitants—Waders, Ducks, &c.—have shewn themselves in considerably reduced numbers this year; owing, probably, to the open character of the weather.

If this East wind continue, accompanied with cold, it is probable that the various birds which retire northward to breed and rear their young, will remain stationary to a later period. This is often the case with the Plovers; and it is just worth noticing that both the Grey and the Golden Plovers assume at this season an entire change of plumage throughout the lower parts, which, from almost pure white, become intensely black. Our beautiful little Grey Wagtail, too, may be seen occasionally at this season on the brinks of our streams and rivers, having assumed in their vernal moult a more intense yellow, with the chin and throat jet black, instead of pure white as in its winter plumage.

EDWD. HEARLE RODD.

Penzance, March 24, 1873.

The following correspondence, which arose out of the above Paper, may have some interest as supplementary to it.—*Ed.*

Truro, March 25th, 1873.

Dear Rodd,

Many thanks for your jottings on Bird History. I want to compare notes with you on a point of change of habits as to localities frequented, of like bearing with those to which you refer. In my early days, and perhaps up to the last 20 years, I never saw a Starling in these parts in the Summer; but I have since noticed them, especially in the sandy district in Perranzabuloe, from time to time. But, last Summer—in August, I think, or early in September—we had a little flock of them at the back of our house on Strangways Terrace. They were attracted by a fine crop of ivy-berries, on a wall of ours, on which they revelled for about a week, alighting on them with their usual wheeling flight, and often carrying the berries away to the fields beyond. They were 8 or 10 in number, and I guessed they were of two broods. I dare say you know their summer habits up the country, and whether my observation has any novelty in it as regards Cornwall.

Yours very truly,

C. BARHAM.

P.S.—Mr. Thomas Worth informs me that a pair of Starlings built their nest last Summer in the end of the Stores, adjoining the Green, and abutting on the Truro River. He watched their progress with much interest, as a great rarity, for 4 or 5 days—he does not know whether they reared a brood.

Penzance, March 26th, 1873.

Dear Barham,

You are one amongst many who have written to me about the change of the habitation of the Starling, in the Western Counties, during the Summer and breeding months. They have been gradually creeping more westward every year during the Summer; but they were formerly quite unknown in the Western Counties except as winter visitants. I have traced them gradually to Trebartha, to Bodmin, and now to Truro. For some years they have been known at Trebartha as breeding there; first, only as a pair or two; but now they are to be seen generally diffused over the Lawn and in the large trees, all through the Spring and Summer months. How to account for this, *non possum;* for the localities they frequent might always have been resorted to—such as holes in trees, old buildings, &c. The large mass of these birds, as you know, move about this time eastward and northward to breed; and as soon as the broods are sufficiently strong for a flight, in the latter months of Summer, they prepare for their great Autumnal movement, with other species which also retire northward to breed.

Yours very truly,

EDWD. HEARLE RODD.

X.—*A Calendar of Natural Periodic Phenomena: kept at Bodmin for the year* 1872.—*By* Thomas Q. Couch, F.S.A.

"Il semble, en effet, que les phénomènes périodiques forment, pour les êtres organisés, en dehors de la vie individuelle, une vie commune dont on ne peut saisir les phases qu'en l'étudiant simultanément sur toute la terre." —*Quetelet.*

N.B.—The names printed in *Italics* indicate plants and animals marked for special observation.

fl., means flowers; fol., foliates; defol., defoliates.

The time of flowering is to be noted when the flower is sufficiently expanded to show the anthers; of foliation, when the leaf-bud is so far open as to show the upper surface of the leaves; of fructification, at the period of dehiscence of the pericarp, in dehiscent fruits; and, in others, when they have evidently arrived at maturity; of defoliation, when the greater part of the leaves of the year have fallen off.

This remarkable year will be described by your meteorological correspondents; but I will call it the *wet* year, and simply record those natural phenomena of the surface which, with much unavoidable interruption, I have been able to note. The months of January, March, and the early part of April, were generally mild, windy, and rainy, producing an early activity in the vegetable world; and our Spring migratory birds were heard earlier than usual. The latter half of April, May, and the beginning of June, were both cold and very wet. On May 22nd there was a very sharp frost, which did great damage to the fruit crops. The excessively wet state of the soil rendered tillage difficult, and in some places impossible. In July the weather was wet but variable, but towards the latter half finer for hay-making, and this improved state of weather continued till the beginning of harvest

in early August. The rest of the year was stormy and wet, with little snow or frost. I will, as before, give the character of the chief crops.

Wheat, though heavy in the quantity of straw, was short in the ear and very ill kerned, and consequently the yield proved far below the average. In several places where the crop was valued on change of tenant, the result on thrashing was from one to three Cornish bushels per acre below the estimated quantity. The crop on the whole was well saved.

Barley. Crop an average one, but here and there badly stained, thereby unfitting it for malting purposes.

Oats. Crop good and even above an average in some places; in others, from rust and other causes, very deficient. On the whole there was an average yield.

Hay. Crop abundant, much above the average, but a large part was wetted and saved in bad condition.

Grass was very plentiful, and hence keep for cattle was abundant throughout the year.

Turnips and *Mangolds.* Crop good.

Potatoes. The inscrutable disease began earlier, and was more destructive to the general crop, than in any year since its commencement in 1845. The yield was scanty, and bad in quality; so diseased in many places that they were scarcely worth digging.

Fruit. The frosts and hail-showers in May were very destructive to fruit of all description; orchards of two or three acres in extent not yielding a bushel of apples.

Birds. It is worth recording the comparative abundance or rarity of our migratory birds; and this subject must be looked at by the light of the previous year or years. The Corncrake and Cuckoo were scarce, and the Woodcock and Snipe remarkably so.

January 7. Primrose (Primula vulgaris), fl.
18. *Snow-drop (Galanthus nivalis), fl.*
23. *Hazel, (Corylus Avellana), fl.*
28. *Gooseberry, (Ribes Grossularia), fl.*

February 4. Aurora Borealis began soon after sunset and lasted until about half-past eight, p.m., and was brilliant, a cloudy sky notwithstanding.

February 9. Barren strawberry, (Potentilla fragariastrum), fl.
— Elder, (Sambucus nigra), fol.
11. Lent-lily (Narcissus pseudo-Narcissus), fl.
14. Honey-suckle (Lonicera Periclymenum), fol.
16. Pilewort, (Ranunculus ficaria), fl.
18. Cardamine hirsuta, fl.
23. Coltsfoot (Tussilago farfara), fl.
26. Whitethorn (Cratægus oxycantha), fol.
— Lilac-tree (Syringa vulgaris), fol.
29. Dog-violet (Viola canina), fl.
— Man. Scarlatina continues.

March 2. Blackberry (Rubus fruticosus), fol.
5. Sky Lark singing.
6. Chiffchaff (Sylvia hippolais), heard.
7. Blackthorn (Prunus spinosus), fl.
— Privet, (Ligustrum vulgare), fl.
19. Evergreen Alkanet, (Anchusa sempervirens), fl.
20. Wild Strawberry (Fragaria vesca), fl.
21. Wild Hyacinth, (Hyacinthus non-scriptus), fl.
29. Sycamore (Acer pseudo-platanus), fol.
30. Horse-chesnut, (Æsculus hippocastanum), fol.
— Hazel (Corylus Avellana), fol.

April 4. Mountain Ash, (Sorbus aucuparia), fol.
8. Lime. (Tilia Europæa), fol.
— Tuberous Vetch (Orobus tuberosus), fl.
— Wood Anemone (Anemone nemorosa), fl.
— Ash, (Fraxinus excelsior), fol.
10. Oak,* (Quercus pedunculatus), fol.
11. Swallow, (Hirundo rustica), arrives.
12. Early Purple Orchis (Orchis mascula), fl.
— Birch, (Betula alba), fol.
15. Yellow Loosestrife, (Lysimachia nemorosa), fl.
21. Ladies' smock, (Cardamine pratensis), fl.
23. Larch, fol.
26. Cuckoo, (Cuculus canorus), heard.
29. Corn-crake, (Crex pratensis), heard.

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* "If the oak leafs before the ash we shall have a cold summer," *Popular Saying*. In this case, as in years of observation, they are simultaneous.

May 1. The White-thorn, (Cratægus oxycantha), fl.
2. Horse-chesnut, (Æsculus hippocastanum), fl.
6. Swift, (Cypselus Apus), arrives.
7. Bugle, (Ajuga reptans), fl.
12. Elder, (Sambucus nigra), fl.
15. Mountain Ash, (Sorbus aucuparia), fl.
27. Earth-nut, (Bunium flexuosum), fl.

June 1. Wild Strawberry, (Fragaria vesca), ripens fruit.
24. Vicia cracca, fl.
— Betony, (Betonica officinalis), fl.
25. Jasione montana, fl.
26. Habenaria chlorantha, fl.
29. Cicada spumaria froths, called *cuckoo spit.*

July 1. Self-heal, (Prunella vulgaris), fl.
— Wild Thyme, (Thymus serpyllum), fl.
6. Catch-fly, (Silene anglica), fl.
— Tutsan, (Hypericum Androsæmum), fl.
7. Centaury, (Erythræa Centaurium), fl.
14. Agrimony, (Agrimonia Eupatoria), fl.
17. Golden Rod, (Solidago virgaurea), fl.
25. Verbascum thapsus, fl.
26. Yellow Toad-flax, (Linaria vulgaris), fl.

* * * * * *

[I regret this unavoidable gap.]

December 23. Thrush, (Turdus musicus), sings.
— Gnats abundant.
— Man. Hooping cough prevails.
31. Galanthus nivalis, fl.

METEOROLOGICAL NOTES FOR 1872.

The characteristic of the last year was wetness; and this was very strongly marked. Taking the year as a whole, the rainfall exceeded that of any other during the 35 years since our observations commenced, except 1841; and it exceeded the average yearly rainfall by more than 2-10ths. Like 1841, the year 1872 was also remarkable for the wetness of all the months,—no one among them having been distinctly dry, whilst in August alone was wetness at all below the average of the past 23 years; for although the quantity of rain in September was fractionally less than the normal quantity, this was more than counterbalanced by the great excess of rainy days, which were 23, instead of 16, the mean number for the month. This last feature belonged to the whole year to a very unusual extent, the number of days on which rain fell having been 245, in place of the average 184. Fortunately for the crops, although of course they suffered greatly and generally, excepting hay, from this lack of fine weather, the great predominance of wetness fell on the two first and the last three months of the year. January and February, taken together, were the wettest we have ever recorded, the rainfall having been nearly double the average, and only five days having been exempt from showers; whilst in the concluding quarter, the quantity of rain was 4 inches beyond the average, and the total of rainy days exceeded the ordinary number by 19, only 15 of the 92 days having been quite dry. This description, whose details are drawn from the Truro register, applies pretty accurately to the county at large; the usual proportions of the several stations having been generally maintained. It may be worth notice that at St. Agnes, although the rainfall exceeded that at Truro, the number of days altogether dry was greater at the former place by 48; whilst at Newquay, the neighbouring station on the north coast, rain was measured on 27 days more than at St. Agnes, although the quantity was 5 inches less. The proximity of the high ground at St. Agnes Beacon, rising directly from the sea, may account, partially at least, for both points of difference. The eastern stations present even more than their customary record of excess of rainfall, over those in the west; that at Bodmin being nearly in the proportion of 14 to 9, and that at Altarnun nearly as 17 to 12 beyond their respective averages; at the latter place no less than 44 inches of rain fell in four months, the two beginning and the two ending the year. At Liskeard, the total fall, 62·41 inches, was in more than usual degree less than at Bodmin (71·93), a difference bearing especially on the winter months.

The same excess of rainfall was registered at Guernsey, in the south, and in the north of England; but it was not at all equally experienced towards the east, or at Greenwich, although the weather throughout the year was unsettled, confirming the deduction made from a long series of years that where

the spring months are of variable character the summer and autumn are seldom continuously fine.

In respect of other points of climate the year 1872 calls for little remark. As a whole it was warm, but without extremes of temperature; the barometric pressure ruled low, and storms were frequent. It it needless to enter into details in regard to the several months, the more so as they are now regularly published in the *Cornwall Gazette*, the *West Briton*, and the *Western Morning News*. A few particulars may deserve mention. On *January* 23rd the barometer fell gradually from 28·67 at 9 a.m., to 28·34 at 4 p.m., at Truro, and at Bodmin to 28·06 at 1 a.m., on 24th, the lowest point ever registered there. The peculiarity of this fall was that it was not attended by storm, only by heavy rain. Mr. Tripp mentions that on the 16th, the sea was heard near Altarnun, 9½ miles straight from the sea near Boscastle. This was followed by a rapid fall of the Barometer, a violent gale, and ·92 inch of rain next day. On 4th *February*, from 5 p.m., to 9 p.m., a very fine Aurora was seen throughout the west. Its colour was a beautiful bright rose pink, and streamers shot out far beyond the zenith. The centres of chief brilliancy varied, but prevailed more towards the west than north. The third week in *March* (21st to 27th), was the coldest of the year. The mean temp. at Altarnun was 37°, that from 1st to 20th having been 47·50. Snow fell there on six out of these seven days. At Truro there was frost through the week.

A summary of Mr. Glaisher's remarks on the Meteorology of this quarter, as noted at the Greenwich Observatory, may be useful as a supplement and complement to our own records. "The warm weather," he says, "which set in on December 13th, 1871, following that period of unprecedented cold which ended on the preceding day, continued with very few and very slight exceptions till 18th March. The mean temp. of these 97 days was more than 5° above their averages." Then followed 8 days of very cold weather, which was severely felt owing to the suddenness of so great a change. The mean temp. of 21st March, was 21¼° below that of 17th. "I do not know any instance of so remarkable a cold period as that ending Dec. 12th, 1871, being followed by as remarkable a warm one as that ending March 18th, 1872."

The next three months need little special notice. The latter half of *April* as of *March* was much colder than the first. "The snow on the 21st," Mr. Tripp remarks, "was general, in the midland and northern counties. It was a most wintry day." *May* was also a bleak month, with several frosts and hailstorms. Fruit trees were much blighted. The first fortnight of *June* was cold. The warmth then increased suddenly, and caused much electrical disturbance. Terrific thunderstorms raged in other parts of the kingdom on the 18th and 24th, but the far west escaped lightly. That on the 18th was strongly felt at Plymouth. Dr. Merrifield states it to have been one of the most continuous and violent he ever registered, lasting for more than ten hours, from 6.45 p.m. In 35 minutes, ·56 inch of rain was measured.

Mr. Glaisher gives a similar report of very changeable weather for this quarter. Periods of excessive and deficient temperature alternated.

The temperature of *July* was about the average, but there was little sunshine. On the 6th and 7th thunderstorms occurred with heavy rain. At Bodmin, Capt. Liddell says, it was the largest (1·98 inch) recorded during the last six years. Penzance escaped. On the night of 25th there was a thunderstorm over east Cornwall. Mr. Tripp describes the lightning as surpassing in magnificence anything he had seen of the kind. "In the N.W. it was accompanied by a curious flickering light, of a reddish colour, whilst the lightning was bluish or white."

August was the most summerlike month, although unsettled for the first ten days. Harvest work was fairly achieved. The weather was variable in *September*, without peculiarities worthy of notice.

The frequency of thunderstorms is mentioned by Mr. Glaisher as the most remarkable feature of this quarter.

The concluding three months of 1872 were alike characterised by excess of wet and storminess. *October* was the least marked by the latter quality. Dr. Merrifield notes that on the 18th there was lightning from a cloudless sky. *November* was generally stormy. A gale blew from the 22nd to 26th, culminating on 23rd, when several shipwrecks, with great loss of life, occurred at Marazion, Gunwallow, and Lamorna, as elsewhere on our coasts. The character of *December* was similar. There was a violent storm on the 8th, especially through the eastward districts. Capt. Liddell designates it "the most terrific gale ever recorded" at Bodmin; and Mr. Tripp notes the uprooting of trees, and damage to buildings, in all directions around Altarnun. At Plymouth, beside such accidents, several vessels were blown on shore, and H.M.S. Cambridge was driven from her moorings in Hamoaze.

The records of the Meteorology of the quarter at Greenwich do not present many points of difference from our own. As here, the most remarkable feature was the frequency of rain. During the three months it fell on 67 days, a greater number, Mr. Glaisher says, than had been previously experienced at Greenwich since 1815. The total fall was 11·32 inches, the largest since 1821. At Truro, the quantity was 17·76 inches; the days of rain 77 in number.

C. BARHAM.

Summary of Meteorological Observations at Truro, in Lat. 50° 17′ N., Long. 5° 4′ W., for the year 1872, from Registers kept at the Royal Institution of Cornwall.

1872.	MONTHLY MEANS OF THE BAROMETER. Cistern 43 feet above mean sea level.																
Month.	Mean pressure corrected to 32 deg. Fahr. at sea level.			Mean of monthly means.	Mean correction for diurnal range.	True mean of monthly means.	Mean force of vapour.	Mean pressure of dry air.	Corrected absolute maximum observed.	Day.	Corrected absolute minimum observed.	Day.	Extreme range for the month.	Mean diurnal range.	Greatest range from 9 a.m. to 9 p.m.	Day.	Greatest range in any 24 consecutive hours.	Between which days it occurred.
	9 a.m.	3 p.m.	9 p.m.															
	in.	in.	in.	in.	in.	in.	in.	in.	in.		in.		in.	in.	in.		in.	
January .	29·636	29·613	29·613	29·621	·004	29·617	·260	29·357	30·166	12	28·723	23 24	1·443	·156	·52	17	·60	3 & 4
February.	29·755	29·750	29·763	29·756	·003	29·753	·284	29·469	30·244	21	29·338	1	·906	·090	·36	26	·53	1 & 2
March ..	29·800	29·797	29·808	29·802	·007	29·795	·260	29·535	30·337	10	29·177	30	1·160	·082	·27	9	·65	13 & 14
April	29·955	29·917	29·979	29·950	·004	29·946	·267	29·679	30·510	6	28·937	22	1·573	·090	·26	12	·44	21 & 22
May	29·997	29·980	29·991	29·989	·003	29·986	·288	29·698	30·441	27	29·527	7	·914	·076	·29	3	·42	3 & 4
June	29·972	29·964	29·967	29·968	·001	29·967	·353	29·614	30·323	16	29·415	9	·908	·074	·21	25	·35	23 & 24
July ...	29·958	29·962	29·966	29·962	·002	29·960	·443	29·517	30·314	4	29·713	29 30	·601	·050	·16	6	·30	5 & 6
August ..	30·021	30·013	30·028	30·021	·004	30·017	·409	29·608	30·364	28	29·519	7	·845	·066	·22	9	·37	9 & 10
Sept.	29·922	29·914	29·937	29·924	·004	29·920	·381	29·539	30·399	13	29·474	24	·925	·068	·20	24	·46	23 & 24
Oct.	29·728	29·723	29·736	29·729	·006	29·723	·295	29·428	30·317	6	29·076	25	1·241	·102	·30	3	·69	23 & 24
Nov.	29·744	29·700	30·054	29·833	·004	29·829	·278	29·551	30·447	7	28·634	30	1·813	·110	·34	29	·46	23 & 24
Dec.	29·583	29·560	29·570	29·571	·003	29·568	·268	29·300	30·050	5	28·900	1	1·150	·171	·52	8	·68	25 & 26
Means ..	29·839	29·825	29·868	29·843	·004	29 839	·332	29·507	30·326		29·203							

REMARKS.—The Barometer used is a Standard, made by Barrow, and compared with the Standard Barometer at the Royal Observatory, Greenwich, by Mr. Glaisher. The corrections for Index Error (+·008), Capillarity (+013), height above sea (43 feet), and temperature, have been applied.

1872.	MONTHLY MEANS OF THE THERMOMETER.																						
Month.	9 A.M.		3 P.M.		9 P.M.		MASON'S HYGROMETER.								SELF REGISTERING.						ABSOLUTE.				
	Dry Bulb.	Wet Bulb.	Dry Bulb.	Wet Bulb.	Dry Bulb.	Wet Bulb.	Mean of Dry Bulb.	Mean correction for diurnal ran	True mean of Dry Bulb.	Mean of Wet Bulb.	Mean correction for diurnal range.	Mean temp. of evaporation.	Wet Therm. below dry.	Mean dew point.	Dew point below Dry Therm.	Mean of all the maxima.	Mean of all the minima.	Approximate mean temp.	Correction for the month.	Adopted mean temp.	Mean daily range.	Maximum.	Day.	Minimum.	Day.	Range.
	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°					°
January..	43·6	41·8	49·0	46·2	45·1	43·6	45·9	0·5	45·4	43·9	0·4	43·5	1·9	41·3	4·1	50·5	40·2	45·3	0·1	45·2	10·3	54	31	25	19 20	29
February	46·5	44·8	51·0	47·7	46·9	45·6	48·1	0·7	47·4	46·0	0·4	45·6	1·8	43·6	3·8	52·6	42·2	47·4	0·2	47·2	10·4	58	29	34	4 7	24
March ..	48·5	45·2	51·0	46·5	45·5	43·7	48·3	0·9	47·4	45·1	0·6	44·5	2·9	41·3	6·1	53·0	42·0	47·5	0·6	46·9	11·0	58	4	26	26	32
April....	50·4	46·7	54·0	48·7	46·7	44·4	50·4	2·1	48·3	46·6	1·3	45·3	3·0	42·0	6·3	56·0	40·6	48·3	0·8	47·5	15·4	66	14 30	30	20	36
May	53·1	48·8	56·3	50·2	49·4	47·0	52·9	2·0	50·9	48·7	1·2	47·5	3·4	44·0	6·9	58·3	43·0	50·6	0·7	49·9	15·3	67	1	32	22 24	35
June	59·0	54·4	62·6	55·6	55·7	53·2	59·1	3·2	56·9	54·4	1·4	53·0	3·9	49·4	7·5	64·7	50·7	57·7	1·3	56·4	14·0	80	17	41	14	39
July	64·0	59·2	65·0	60·7	60·0	57·7	63·0	1·7	61·3	59·2	1·0	58·2	3·1	55·6	5·7	69·1	56·0	62·5	1·6	60·9	13·1	83	21	48	30 5	35
August ..	64·0	59·0	67·8	59·9	59·0	56·6	63·6	2·0	61·6	58·5	1·3	57·2	4·4	53·4	8·2	69·8	54·0	61·9	1·0	60·9	15·8	80	18	43	9 13	37
Sept.....	59·0	55·6	62·8	56·6	55·9	53·8	59·2	1·3	57·9	55·3	0·8	54·5	3·4	51·5	6·4	64·5	53·0	58·7	1·1	57·6	11·5	72	4	31	23	41
Oct.	50·4	48·0	54·5	50·0	47·6	45·8	50·8	1·0	49·8	47·9	0·6	47·3	2·5	44·6	5·2	55·8	42·8	49·3	0·3	49·0	13·0	62	2	31	15	31
Nov.....	47·8	45·4	50·7	47·4	47·0	45·3	48·4	0·5	47·9	46·0	0·4	45·6	2·3	43·1	4·8	52·2	43·3	47·7	0·1	47·6	8·9	59	7	33	13	26
Dec.	45·9	44·1	49·0	46·7	45·5	44·0	46·8	0·6	46·2	44·9	0·6	44·3	1·9	42·1	4·1	50·9	42·0	46·4	0·1	46·3	8·9	56	22	27	12	29
Means ..	52·7	49·4	56·1	51·3	50·4	48·4	53·1	1·4	51·7	49·7	0·8	48·9	2·8	46·0	5·7	58·1	45·8	52·0	0·7	51·3	12·3	66		33		33

The Thermometers are placed on the roof of the Royal Institution in a wooden shed, through which the air passes freely. The Standard Wet and Dry Bulbs are by Negretti and Zambra, and have been corrected by Mr. Glaisher.

1872.	WINDS.																											
Month.	E.			S.E.			S.			S.W.			W.			N.W.			N.			N.E.			AVERAGE FORCE.			
	9 a.m.	3 p.m.	9 p.m.	9 a.m.	3 p.m.	9 p.m.	9 a.m.	3 p.m.	9 p.m.	9 a.m.	3 p.m.	9 p.m.	9 a.m.	3 p.m.	9 p.m.	9 a.m.	3 p.m.	9 p.m.	9 a.m.	3 p.m.	9 p.m.	9 a.m.	3 p.m.	9 p.m.	9 a.m.	3 p.m.	9 p.m.	Mean.
January..	1	2	2	1	1	1	4	5	1	8	11	11	7	6	7	8	4	8	2	2	1	0	0	0	2·7	3·0	2·5	2·7
February.	3	1	2	4	6	4	6	6	1	6	4	11	7	8	9	1	1	0	1	1	1	1	2	1	2·2	3·0	2·4	2·8
March ..	4	3	3	5	4	3	3	3	1	5	7	7	4	5	3	2	3	6	4	5	9	4	1	1	2·6	3·0	2·2	2·6
April	0	1	1	1	2	1	6	4	0	5	6	8	2	0	0	2	4	5	10	10	14	4	3	1	2·5	3·0	2·0	2·7
May	4	1	0	0	0	1	0	3	1	0	6	0	6	6	7	13	13	14	8	5	5	0	2	3	2·5	2·8	2·0	2·4
June	1	2	3	5	5	0	3	1	2	0	3	6	7	7	4	11	10	11	3	2	4	0	0	0	2·3	2·7	2·0	2·3
July	3	3	3	7	7	4	5	7	7	0	2	2	5	2	1	4	6	9	7	4	5	0	0	0	2·0	2·5	1·8	2·1
August ..	7	5	5	3	3	2	1	1	1	4	2	3	3	4	4	5	6	10	8	10	6	0	0	0	2·2	2·8	1·5	2·2
Sept.....	1	2	0	3	4	4	4	0	0	1	3	3	11	11	8	7	8	12	3	2	3	0	0	0	2·7	3·0	1·9	2·5
Oct.	0	0	0	1	1	2	5	5	0	5	6	8	3	3	4	10	10	12	4	4	4	3	2	1	2·2	2·7	2·0	2·3
Nov.....	0	0	0	1	1	0	5	1	0	11	10	10	3	6	6	4	6	9	3	4	2	3	2	3	2·8	3·4	2·7	2·9
Dec.	4	1	0	0	1	3	3	5	0	9	12	11	6	4	2	6	3	8	3	4	5	0	1	2	2·4	3·0	2·6	2·7
Total....	28	21	19	31	35	25	45	41	14	54	72	80	64	62	55	73	74	104	56	53	59	15	13	12	29·1	34·9	25·6	30·2
Means ..	22·7			30·0			33·3			68·7			60·3			83·7			56·0			13·3			2·4	2·9	2·1	2·5

The force of the Wind is estimated on a scale from 0 to 6, from *calm* to violent *storm*.

1872.	WEATHER.																			
Month.	AVERAGE CLOUDINESS.				RAINFALL.					Mean weight of vapour in a cubic foot of air.	Mean additional weight required for saturation of the air.	Mean humidity of atmosphere.	Mean elastic force of vapour.	Mean weight in grains troy of a cubic foot of air.	Amount of water in a vertical column of air.	SUN.			Dry.	Wet.	REMARKS.
	9 a.m.	3 p.m.	9 p.m.	Mean.	Amount in inches. Truro.	Penarth.	No. of days in which rain fell.	Greatest Fall in 24 hours. Truro. Depth.	Date.							Shine.	Gleam.	Cloud.			
					in	in.				grs.	grs.		in.	grs.	in.						
January .	7·6	7·6	7·4	7·5	8·13	6·85	28	·75	3	2·9	0·5	86	·260	532·3	2·8	16	4	42	63	30	Frost, 15. 16, 19, 20, 27. Hail, 18. Gale, 1, 3, 4, 5, 17, 23. 26. Remarkable Rain, 4, 30. Thunder heard, Lightning not seen, 24.
February	7·7	7·5	7·4	7·2	6·98	6·54	26	·83	22	3·2	0·5	86	·284	529·9	3·9	21	5	32	66	21	Gale, 1, 22, 29. Fog, 5. Aurora Borealis, 4. Rainbow, 13.
March ..	7·5	7·0	6·0	6·8	3·98	3·99	20	1·10	27	2·9	0·8	79	·260	530·0	2·8	29	5	28	76	17	Frost, 10, 22, 23, 24, 25, 26. Hail, 21, 26. Gale, 18. 28. Snow, 21, 22. Remarkable Rain, 27.
April	6·2	6·3	4·2	5·6	2·77	3·04	12	1·09	21	3·0	0·8	79	·267	530 0	2·9	36	5	19	79	11	Frost, 4, 6, 20. Hail, 17, 18. Gale, 2, 17, 22, 23. Cuckno heard, 21. Swallow seen, 24. Fog, 30.
May	6·9	6·6	6·4	6·6	2·79	2·85	19	·64	22	3·4	0·8	80	·288	525·7	3·9	36	8	18	85	8	Frost, 23, 24 Hail, 8, 9, 10, 19, 20, 22. Thunder Storm, 22.
June	7·4	6·5	7·0	6·9	2·77	2·74	16	·49	7	3·9	1·3	75	·253	529·2	3·3	35	6	19	79	11	Hail, 6, 7, 8. Gale, 11. Lightning seen, Thunder not heard, 19. Aurora Borealis, 4.
July	6·9	6·3	5·9	6·4	2·69	2·99	12	1·44	6	4·9	1·1	82	·443	514·6	6·1	41	3	18	86	7	Aurora Borealis, 7. Thunder Storm, 6, 7. Remarkable rain, 6.
August ..	5·8	5·3	5·1	5·4	1·99	1·86	12	·52	6	4·4	1·8	72	·409	523·9	5·6	45	2	15	88	5	Thunder Storm, 1, 2. Lightning seen, Thunder not heard, 7. Lightning seen, Thunder not heard, 30.
Sept.	7·5	6·8	8·9	7·7	3·26	3·76	23	1·28	23	4·1	1·3	76	·381	518·1	5·2	32	9	19	81	9	Gale, 4, 5, 25, 26, 27. Hail. 21, 22. Thunder Storm, 3. Lunar Rainbow, 19.
Oct. ...	6·7	6·8	6·0	6·5	5·67	5·51	25	1·04	30	3·3	0·8	80	·295	526·9	4·0	35	2	25	80	13	Frost, 6, 7, 14, 15. Gale, 10, 19, 21, 23. Hail, 10, 11, 12, 16, 17. Remarkable rain, 30. Lunar Rainbow. 11.
Nov.	6·9	7·2	6·7	6·9	5·96	5·70	27	·84	27	3·3	0·5	86	·278	528·8	3·8	30	0	30	66	24	Frost, 13. Gale, 2, 10, 21, 2., 23, 25, 26, 30. Hail, 9, 10, 17, 20. Thunder heard, Lightning not seen, 2. Thunder Storm, 24.
Dec.	7·5	7·5	7·8	7·6	6·13	5·85	24	·76	27	3·1	0·5	86	·268	531·0	3·7	25	2	35	66	27	Frost, 5, 6. Gale, 8, 12, 20, 24, 25. Hail, 7, 8, 9. Bat flying, 24.
Means ..	7·0	6·8	6·7	6·8	53·12	51·68	244			3·7	0·9	80	·307	526·7	4·0	31·0	4·2	25·0	76·0	15·0	

Cloudiness is estimated by dividing the sky into ten parts, and noting how many of these are obscured. The rain gauge at Truro is placed on the roof of the Royal Institution at about 40 feet frnm the ground. Gleam is recorded when the sun's disk is visible through a film of cloud. The rain gauge at Penarth, near Truro, is 100 feet above the mean level of the sea.

Rain-fall in Cornwall in 1872, *with the yearly and monthly averages for some Stations.*

STATIONS FROM WEST TO EAST.	Jan. in.	Feb. in.	March in.	April in.	May in.	June in.	July in.	August in.	Sept. in.	Oct. in.	Nov. in.	Dec. in.	Total 1872. in.	Average yearly total.
(*a*) S. Sennen, Land's End, Mr. J. Symons 1872	6·62	4·36	4·14	2·42	1·84	2·74	2·47	3·01	3·24	6·59	5·05	5·72	48·20	
Days with rain..... 1872	26	20	20	10	9	11	8	8	10	27	27	26	202	
(*b*) Penzance, Mr. W. H. Richards..1872	8·99	6·32	4·41	3·06	1·86	3·30	2·65	2·08	2·53	7·42	6·78	7·81	57·21	
Average of last fourteen years	5·45	3·54	3·27	2·27	2·09	1·94	2·49	2·77	3·65	4·78	4·45	5·26		41·98
(*c*) Helston, Mr. M. P. Moyle.....1872	7·03	6·25	3·70	3·61	2·49	2·55	3·39	2·21	2·94	7·15	4·92	5·78	52.02	
Average of last twenty-three years	4·26	2·70	3·02	2·52	2·33	2·14	2·54	2·61	3·09	4·50	3·57	3·79		37·17
Days with rain.....1872	26	27	18	13	16	13	15	12	20	23	24	23	230	
Average of last twenty-three years	20·4	15·8	15·8	11·9	11·9	12·1	12·9	12·6	13 9	18·2	17·3	19·2		183·1
(*d*) Truro, Royal Institution of Corn. 1872	8·13	6·98	3·98	2·77	2·79	2·77	2·69	1·99	3·26	5·67	5·96	6·13	53·12	
Average of last twenty-three years	5·26	2·98	3 07	2·69	2·62	2·25	2·43	2·50	3·38	4·89	4·22	4·66		41·08
Days with rain..... 1872	28	26	20	12	19	16	12	12	23	25	27	25	245	
Average of last twenty-three years	21·0	16·2	16·8	13·2	13·7	12·6	12·7	13·2	16·0	20·0	18·6	20·0		184·3
(*e*) St. Agnes, Mr. J. Opie 1872	7·61	5·53	3·84	3·07	2·54	4·23	·287	1·46	3 63	7·07	5·80	6·22	53·87	
Days with rain 1872	25	21	15	9	13	14	8	8	15	20	21	24	193	
(*f*) Newquay, Mr. Tregidgo 1872	6·67	6·38	3·15	2·60	1·51	3·67	2·30	1·42	2·68	7·51	5·65	5·40	48·94	
Days with rain.....1872	26	26	18	8	14	14	8	16	19	25	24	22	220	
(*g*) S. Mewan, Rev. G. L. Woollcombe, 1872	9·59	7·82	4·68	2·46	3·11	3·13	3·13	1·57	5·44	7·34	8·81	7·83	64·91	
(*h*) Bodmin, Com. J. Liddell, R.N. 1872	10·18	9·59	5·49	4·58	3·14	3 20	3·25	2·22	4·79	8·10	7·90	9·19	71·93	
Average of last twenty-three years	5·93	3·32	3·51	2·90	2·88	2·98	3·03	3·27	3·85	5·55	4·56	5·14		46·92
Days with rain.....1872	28	25	23	14	19	17	12	12	24	27	26	25	252	
Average of last twenty-three years	22·0	18·6	17·5	14·0	13·9	14·7	15·1	15·7	17·1	20·5	21·0	22·8		212·9
(*i*) Altarnun Vicarage, Mr. C. U. Tripp.1872	12·47	9 59	6·10	4·33	3·34	3·92	4·00	2·84	5·90	9·10	9·35	12·43	84·07	
Average of last nine years	8·57	5·96	4·47	3·21	3·91	2·19	3·44	3·93	5·78	7·65	5·71	7.36		61·64
Days with rain.....	28	25	21	12	16	17	17	13	26	26	24	26	251	
Average of last nine years..... ..	21·2	21·3	18·4	14·3	13·9	12·2	14·9	15 1	19·0	22·1	18·4	20·6		212·0

(*a*) Diameter of Gauge 5 inches; height above sea 308 feet; above ground 3 feet.
(*b*) „ „ 12 „ „ „ 86 „ „ „ 3 „
(*c*) „ „ 5 „ „ „ 115 „ „ „ 5 „
(*d*) „ „ 5 „ „ „ 56 „ „ „ 40 „
(*e*) „ „ 11 „ „ „ 278 „ „ „ 1 foot 4 in.

(*f*) Diameter of Gauge 6 inches; height above sea 90 feet; above ground 1 foot 9 in.
(*g*) „ „ 5 „ „ 275 „ „ 1 „ 0 „
(*h*) „ „ 5 „ „ 338 „ „ 1 „ 0 „
(*i*) „ „ 0 „ „ 570 „ „ 1 „ 0 „

CHRONOLOGICAL MEMORANDA.

1872.

January 2. The *Western Morning News* publishes a "Meteorological Summary for the year 1871."

January 3. The *Cornish Telegraph* publishes an "Abstract of the Weather at Penzance and neighbourhood for the year 1871"; by W. Hosken Richards.

January 11. Conversazione of the Plymouth Institution, at the Plymouth Athenæum.

January 11. The *West Briton* publishes an Article entitled "Cornwall in 1871 and the beginning of 1872."

January 20. The *Cornwall Gazette* publishes a letter, signed "Christopher Cooke," London, entitled "Cornwall, (1797)."

February 14. *Cornish Telegraph* records the recent capture of a Bear Fish, in a herring-net, at Mevagissey. It came into the possession of Mr. Matthew Dunn, the ichthyologist, who has been authorized to collect specimens of rare fish for the Crystal Palace Aquarium.

Februarg 21. *Cornish Telegraph* notices the recent capture of a *Dartford Warbler*, at Trevider Bottom, St. Buryan; and of a *Black Redstart* in Morrab Fields, Penzance.

February 21 and *February* 27. *Western Morning News* publishes reports of the Extraordinary Rainfall in January and February; from various places in Cornwall and Devon.

February 22. Annual Meeting of the Royal Cornwall Polytechnic Society; the President, Mr. Charles Fox, presiding. Lord Robartes, Capt. Basset, Mr. Warington Smythe, F.R.S., &c., Mr. R. N. Fowler, M.P., and Mr. F. Hill, were elected Vice-Presidents.—A paper concerning mine reports and plans, received from Mr. Williams, of Hayle, pointed out that there was no place, as far as the writer knew, where people could see old mine reports and mine plans. He was aware of the existence of the Mining Record Office in London, but thought it was of the greatest importance to mine owners, and especially to those who wished to re-open old mines, that they should be able to see correct reports of former working of these mines. He suggested that there should be a catalogue of mine reports, and accounts taken of such plans as they might get hold of.—The CHAIRMAN looked upon this as a very valuable suggestion; if it had been adopted seventy years ago, thousands of pounds would have been saved.

February 29. Annual Conversazione of the Torquay Natural History Society. Among articles exhibited were: Ornithological and zoological specimens sent by Mr. Pershouse; fossil bones and shells, &c., from a cave in Borneo, by Mr. Pengelly; bone implements and textile fabrics from the Swiss Lake Dwellings; Alpine Plants; and Fossils from Kent's Cavern.

March 1. *Western Morning News* publishes a Report of a Lecture on "British Storms," delivered by Mr. T. W. Coffin to the members of the Plymouth Institution.

March 8. A brilliant meteor seen at many places in West Cornwall, in the western part of the heavens. After shooting upwards it exploded, giving out a brilliant bluish light.

March 13 and 16. *Western Morning News* contains accounts of the opening of a tumulus at Trevelgy, Newquay, by Mr. W. Copeland Borlase, F.S.A., of Castle Horneck. Among the exploring party were: Mr. Spence Bate, F.R.S., Captain Oliver, R.A., Mr. Evans, and Rev. W. Iago, F.S.A.

March 16. *Cornwall Gazette* states that Sir J. Maclean had exhibited to the Archæological Institute a Deed of Grant, 18th of Henry the Seventh, which shews the existence of a guild at Blyston, Cornwall.

March 16. *Cornwall Gazette* publishes a letter on "Cornish Lighthouses," from "Christopher Cooke," London.

March 28. Capt. Oliver, R.A., F.R.G.S., delivered a Lecture, in connection with the Plymouth Institution, on "The Præ-historic Remains of Brittany."

April 4. *West Briton* publishes a letter of inquiry, signed "F. S. A.," concerning "Cornish Proverbial Sayings."

April 4. *Western Morning News* publishes a letter, signed "Henry H. Drake," concerning "The Father of Sir Francis Drake."

April 11. *West Briton* publishes a letter, signed "Lyscerruyt," on "Cornish Proverbial Sayings"; and a letter, signed "Δ", on "Barrows and Cromlechs."

April 12. *Western Morning News* publishes a letter, in which objections are taken to the recent operations at the Trevelguê Barrows. The letter is signed by: W. E. Michell, the Fort, Newquay; R. A. Chudleigh, Pool, Camborne; R. Mildren; E. Tippett, Newquay, St. Columb Minor; Thomas Boyle, surgeon, Newquay.

April 15. Rev. F. C. Hingeston-Randolph, in a letter published in the *Western Morning News*, records that, on the 10th of April, he saw a pair of Hoopoes, near Ringmore Rectory, South Devon. The letter further states: "We have had many strange birds on our coast this year, suggesting, possibly, some peculiarity in the season. A little time since, two large gannets were washed ashore on the sands at Challaborough, and large numbers of puffins and guillemots have been cast up on all our beaches."

April 23. The Teign Vale Naturalist and Field Club held its first annual meeting for the year. Their walk was from Kingskerwell to Compton Castle, thence by Cockington to Torquay. Mr. E. Vivian was elected President; and the retiring President, Rev. J. M. Hawker, and Mr. A. Pengelly, were elected vice-presidents.—The second meeting for the season was held on Tuesday, May 28, at Chudleigh.

April 27. *Cornwall Gazette* publishes a letter, from "Christopher Cooke," London, concerning the "Tregagle Family."

May 2. *Western Morning News* states that a Sea Devil *(Lophius piscatorius)* taken in Torquay Harbour, had been sent to the Crystal Palace.

May 2. At a meeting of the Plymouth Institution, Mr. J. N. Bennett read a paper on the "Ammil," a curious meteorological phenomenon, almost peculiar to Dartmoor.

May 4. *Western Morning News* records the recent capture of a Spinous (or Ground) Shark by a Mevagissey fishing-boat. It was captured by hook and line, and was forwarded by Mr. Matthias Dunn to Mr. Frank Buckland.

May 7. Mr. Humphry Willyams, of Carnanton, died in London, in the 81st year of his age.

May 18. Royal Institution of Cornwall; Spring Meeting. Mr. John St. Aubyn. M.P., President, in the chair. The President's Address included observations on the "Mines Regulation Bill," and on a Bill, prepared by Sir John Lubbock, Bart., M.P., "to provide for the better preservation of historical monuments and objects of antiquity in Great Britain and Ireland." The following Papers were presented:—On the Original Use of the Mên-an-Tol, or Holed Stone, in the parish of Madron; Mr. E. H. Wise Dunkin. Notes on the similarity of some of the Cornish rock-names and miners' terms to Irish words; G. Henry Kinahan, M.R.I.A., &c. Note on a remarkable balk of timber covered with the Goose Barnacle *(Lepas anatifera, Linn.)* drifted ashore in March, 1872, at Ventnor, Isle of Wight; Albert Way. Notes on the Ornithology of Cornwall; Mr. E. Hearle Rodd. On two old Mining Patents; Mr. R. N. Worth. Chronicles of the Cornish Saints (VI.—S. Burian, and VII.—S. Crantock); Rev. John Adams, M.A. See *Journal of the Royal Institution of Cornwall*, No. xiv.

May 22. Miners' Association of Cornwall and Devon. General Meeting at Redruth; Mr. A. Pendarves Vivian, M.P., President of the Association, in the chair. Mr. G. L. Basset, Tehidy, elected President for the ensuing year.

May 29. Death of Mr. John Samuel Enys, of Enys, in the 76th year of his age.

May 31. *Western Morning News* publishes a letter from Rev. F. C. Hingeston-Randolph, on "Daniel Gumb's House," (recently destroyed), "and the Cheesewring."

June 3. *Western Morning News* publishes a letter on "The Cheesewring," signed "A. B." It states that, fifteen years ago, Mr. Kendall obtained from the Duchy an order that the quarrymen should not approach the Cheesewring within limits set out on a plan.

June 5. *Cornish Telegraph* publishes a letter, signed "E. H. W. Dunkin," in support of his suggestion at the Spring Meeting of the *Royal Institution of Cornwall*, "that the Mên-an-Tol is the remnant of a sepulchral structure, and that the perforated stone was placed in such a manner as to serve the purpose of an entrance stone."

June 6. *West Briton* contains a Memoir of the late John Samuel Enys, Esq., of Enys, and of the Enys family.

June 7. A letter on "The Trevelgue Tumuli," appears in the *Western Morning News*. signed "J. E. O.", Hastings Villa, Cardiff. It suggests that the Tumuli should be kept open, and be protected.

June 13. *Western Morning News* publishes the following letter, headed "Historical Monuments":— "Sir, The mention of Bishop Bruere's monument in Exeter Cathedral reminds me of his visit to Carlsbad, in Bohemia, in the thirteenth century. I read in the library of that much frequented watering place that some tin mines in the neighbourhood were discovered by a Cornishman, who was in the suite of this bishop when he escorted the Princess Isabella on her journey to Vienna to be married to the Emperor. The tin is in conspicuous crystals, which facilitates the washing of the ore when winter

cold or summer drought diminishes the supply of water. The miners spoke to me of kibbles, winzes, &c., indications of the Saxon origin of some of our terms as well as of our practical knowledge on mining. Should not the tomb at Landulph, of one of the last of the Palæologoi of the Imperial Family of Constantinople, have claimed the attention of the Society of Antiquaries? Yours truly,

Trebah, 11th June, 1872. C. Fox."

June 17. *Western Morning News* publishes a letter signed "C. R. S." on "Historical Monuments," and directing attention to an inscribed tablet in the parish church of Paignton.

June 18. A letter on "Historical Monuments," from Mr. J. Jope Rogers, in the *Western Morning News*, contains the following:—"Mr. Charles Fox and others who are interested in the preservation of all monuments of antiquity in Cornwall may like to know, in answer to his question in your columns on the 13th inst., that the curious tablet in Landulph Church in memory of Theodore Palæologus was not forgotten in the report sent to the Society of Antiquaries. Some twenty Monuments were returned from Cornwall, but it was not expected that all would be included in the report of the society to the Government, their object being chiefly to preserve such monuments as illustrate English—not European—history. The returns of all monuments reported to the society, are, however, preserved in their library for future use, if needed."*

June 20. *Western Morning News* publishes a letter, from Rev. F. C. Hingeston-Randolph, on the perilous condition of "The Cheesewring," with suggestions for its protection.

June 22. *Western Morning News* publishes a letter, from Mr. Angus Mackintosh, M.D., Callington, on "Petrified Moss, the effect of Fresh Water," as seen by him in an old mine-shaft near the Tamar.

June 22. *Western Morning News* publishes a notice of the Rev. William Beal, author of "Britain and the Gael," who died at Liskeard on the 18th of June, aged 87.

June 24. *Western Morning News* contains the following: "The whale bones from Pentuan Stream-Work, near St. Austell, presented to the Royal Geological Society of Cornwall by the late Mr. J. W. Colenso in 1829, after having been examined by the late Mr. Cliff, F.R.S., have been lately re-examined by Mr. W. H. Flower, F.R.S., Conservator of the Museum of the Royal College of Surgeons, who states in the 'Magazine of Natural History' for the present month, that they 'belong to no species of whale known to

* Historical Monuments in Cornwall.—In February, 1869, the Office of Works requested the Society of Antiquaries to furnish "a list of such Regal and other Historical Tombs or Monuments existing in Cathedrals, Churches, and other Public Places and Buildings, as in their opinion it would be desirable to place under the protection and supervision of the Government, with a view to their proper custody and preservation." In accordance with this request a committee was appointed by the Society to make a report. The committee obtained the assistance of the local societies and Fellows of the Society (including Mr. J. J. Rogers for Cornwall), and drew up a report last February which has just been published as a Parliamentary Blue-book. There are in all 610 monuments which the Society of Antiquaries recommend should be placed under the protection of the Government; 5 of these are in Cornwall, namely, Anthony Church, Person commemorated—Richard Carew, author of "Survey of Cornwall;" date of death, 1620; marble tablet. Callington Church, Robert Lord Willoughby de Broke, captain-general of the expedition to Brittany, &c., 1502; alabaster altar tomb with recumbent effigy. Duloe Church, Sir John Arundell, M.P., Cornwall, temp. Charles I. Held Pendennis Castle for the King till the last, 1647; effigies. Kilkhampton Church, Sir Beville Granville, killed at the battle of Lansdown, near Bath, 1643; trophied monument. Padstow Church, Sir Wm. Morise, Kt., 1676; incorporated with monument to Prideaux family. *Cornwall Gazette, June* 22.

inhabit the British Seas,' or, indeed, to any 'known existing whale.' A specimen of the same creature, however, was more recently found at Graso, in the Baltic, and a single vertebra cast ashore at Babbicombe in a mutilated condition, has been referred to the same species."

June 24. Death of Mr. Charles Dacres Bevan, County Court Judge of Cornwall, at his residence near Fowey; age 66.

June 25. *Western Morning News* records the recent capture of a Pompilus (*Centrolophus Pompilus*, Cuv.; *Blackfish*, Johnston), in a mackerel net, off the Deadman. It appeared to have followed a large Porbeagle Shark which was captured in the same net at a few feet distance.

June 27. *West Briton* publishes a letter from the Rev. Dr. Bannister, on "Polperro" and the "Glossary of Cornish Names."

June 28. *Western Morning News* publishes a letter from Rev. F. C. Hingeston-Randolph, concerning the Cheesewring and Daniel Gumb's House. It contains assurance from Messrs. Freeman—that the renewed report about danger to the Cheesewring from blasting was utterly without foundation,—that no blasting had taken place in its immediate neighbourhood for twelve months,—and that Sir John Coode, who had been employed by the Duchy Council to investigate the matter, had proved by experiments that the blasting operations had no effect upon the Cheesewring.

June 29. *Western Morning News* publishes a letter, signed "T. Q. Couch," on "Cheesewring Manipulations"; and also a letter from "Angus Mackintosh, M.D." on "Polperro" and the "Glossary of Cornish Names."

June 29. *Cornwall Gazette* publishes a letter, from "Christopher Cooke," on "Cornish Topography," giving a list of works, including a few published early in this century, as useful for reference.

July 2. *Western Morning News* publishes a letter, signed "J. W. M.", on "Polperro" and the "Glossary of Cornish Names." It traces the name "Lansalloes" to "Llan-celwys," a church in a grove or secluded spot.

July 30. Devonshire Association for the Advancement of Science, Literature, and Art. Eleventh Annual Meeting, at Exeter; The Right Reverend the Lord Bishop of Exeter, President. The following Papers were read:—Fossil Teeth at Sidmouth; P. O. Hutchinson. What is Grimspound? G. Wareing Ormerod, M.A., F.G.S. Iron Pits; P. O. Hutchinson. Astigmatism and Colour Blindness; E. Vivian, M.A. Some Notes on that part of Mr. Chanter's Paper relating to the Insect Fauna of Lundy Island; E. Parfitt. Notes on the Rocks in the neighbourhood of Plymouth; R. N. Worth. Records of Tide, Rain, and Wind, during the Carboniferous Period in North Devon; Townshend M. Hall, F.G.S., &c. Notice of Præ-historic Remains formerly existing near the Drewsteignton Cromlech; G. Wareing Ormerod, M.A.. F.G.S. Is there evidence of Glacial Action in the valleys of Dawlish and Ashcombe? George Pycroft. Bronze Celt found near Sidmouth; P. O. Hutchinson. Exmouth Warren, and its threatened destruction; J. M. Martin, C.E., F.M.S. Ancient Exeter and its Trade; Sir John Bowring, LL.D., F.R.S., &c. On the Progress of Electro-Therapeutics; J. N. Hearder, D.Sc., Ph.D., F.C.S., &c. Some Account of the Ancient Guilds of the City of Exeter; W. Cotton. The Rainfall on the St. Mary Church road, Torquay, during the eight years ending December 31, 1871; W. Pengelly, F.R.S., F.G.S. Note on an Experiment to predict the Annual Rainfall; W. Pengelly, F.R.S., F.G.S. Notes on the *Machairodus latidens* found by Rev. J. Mac Enery, in Kent's Cavern, Torquay; W. Pengelly, F.R.S., F.G.S. Is it a Fact? W. Pengelly, F.R.S., F.G.S. Devonshire Tokens issued in the 17th Century; H. S. Gill. On Rainfall as affected by the Height of Guages above

the ground; E. Vivian, F.M.S. Vital Statistics, from the experience of the United Kingdom Temperance and General Provident Institution; E. Vivian, M.A. The Literature of the Oreston Caverns; Compiled by W. Pengelly, F.R.S., F.G.S. A few Remarks on an Ancient British Coin found on Northernhay, Exeter; H. S. Gill. On Fables and Fabulists, in connection with John Gay; Sir John Bowring, LL.D., F.R.S., &c. Sir Thomas Bodley; Sir John Bowring, LL.D., F.R.S., &c. On Aurora Borealis; Rev. R. Kirwan, M.A., F.S.A. The Fauna of Devon; Part VIII, Echinodermata; E. Parfitt. The Rainfall in Devonshire in 1871, and in the six years ending with December 31, 1871; W. Pengelly, F.R.S., F.G.S. Seven Years Meteorology of Sidmouth, 1865—1871; J. Ingleby Mackenzie, M.B. Cantab., M.R.C.S., &c. Supplementary List of Works on the Geology, Mineralogy, and Palæontology, of Devonshire; William Whitaker, B.A. (Lond.), of the Geological Survey of England. The Signs of the Hotels, Taverns, Inns, Wine-and-Spirit-Vaults, and Beershops, in Devonshire; W. Pengelly, F.R.S., F.G.S. On the Original Map of the Royal Forest of Dartmoor, illustrating the Perambulation of Henry III, 1240; C. Spence Bate, F.R.S., &c. Researches into some Ancient Tumuli on Dartmoor; C. Spence Bate, F.R.S., &c.

July 31. Death, at Plymouth, of Mr. Augustus Smith, of Tresco Abbey, Scilly, in his 68th year. Mr. Smith was President of the Royal Institution of Cornwall in the years 1864 and 1865; from 1857 until 1865 he represented Truro in Parliament; he was a magistrate for the counties of Cornwall, Bucks, and Herts, and a deputy-lieutenant for the last-named; and from 1863 until his decease he was P.G.M. of Freemasons in Cornwall.

August 1. *West Briton* publishes a letter, from "Curiosus," concerning "British Museum Photographs."

August 5. An "Octopus" (Eight-armed Cuttle-fish) caught off Plymouth by a trawl sloop, and placed in the pond of the Crystal Palace Aquarium Company under the Citadel, to be sent thence to the Crystal Palace.

August 7. Miners' Association of Cornwall and Devon. Annual Excursion by Classes, from St. Just, Pendeen, Breage, Helston, Hayle, Camborne, Redruth, St. Day, and St. Austell. Visits to the Phœnix and West Phœnix Mines, and the Cheesewring. The party (about 70 in number) were under the guidance of the Rev. Saltren Rogers, M.A., and Mr. J. H. Collins, F.G.S., Lecturer and Assistant Secretary of the Association.

August 8. *Western Morning News* states that a remarkable Inscribed Stone near Portquin, on the north coast of Cornwall, had just been made known by Sir John Maclean and the Rev. W. Iago. It marked the burial-place of Broegan, an early Christian, and had received the name of "Long-Cross."

August 13, *and following days. 42nd Annual Meeting of the British Association, at Brighton;* President, Dr. William B. Carpenter, M.D., LL.D., F.R.S. Among the Papers read were the following:—Fourth Report of the Marine Fauna of South Devon; Mr. C. Spence Bate, F.R.S., &c. Eighth Report of the Committee for the Exploration of Kent's Cavern; Mr. W. Pengelly, F.R.S., F.G.S. On the Exploration of some Tumuli on Dartmoor; Mr. C. Spence Bate.

August 14. *Western Morning News* publishes a letter from the Reverend Augustine Chudleigh, Pool, on "The Trevelguey Barrows," giving the results of his own observations.

August 16. *Western Morning News* publishes a letter from the Rev. Dr. Bannister, on "Polperro" and the "Glossary of Cornish Names," an especially on the etymology of "Lansallos."

August 17. *Cornwall Gazette* publishes a communication on "The Scilly Isles," signed "W."; with translated extracts, from Records of the Duchy of Cornwall, relating to the state of the islands, and the position of their owner, a short time after the creation of the Duchy.

August 19. *Western Morning News* publishes a letter from "Angus Mackintosh, M.D.," on "Polperro" and the "Glossary of Cornish Names."

August 19 *and* 20. Royal Institution of Cornwall. Excursion to St. Columb Major, St. Mawgan, St. Columb Minor, Cubert, and Perranzabuloe. (See *Journal of the Royal Institution of Cornwall*, No. xiv, *and 55th Annual Report*).

August 21. Royal Cornwall Polytechnic Society. 40th Annual Meeting; Mr. Charles Fox presiding.

August 22. *West Briton* publishes a letter, signed "Tre," on "Scientific Excursions."

August 22. Miners' Association of Cornwall and Devonshire. Annual Meeting at Falmouth; Mr. Basset, of Tehidy, presiding. The following Papers were read: By Mr. Willoughby, on the New Steam Stamps of his Firm. Mr. Bickle, on Husband's Pneumatic Stamps. Mr. Tonkin, Dolcoath, on the Burleigh Drill in the Hoosac Tunnel, New York. Capt. Williams, on the Duty of Cornish Engines. Mr. T. B. Jordan, on Sach's Boring Machine.

August 24. *Cornwall Gazette* publishes a letter, from the Rev. Dr. Bannister, on "Polperro" and the "Glossary of Cornish Names."

August 29. *West Briton* contains an Article entitled "A Trip to the Lizard, &c."; signed "Walker."

September 11. *Cornish Telegraph* publishes a letter, from the Reverend Dr. Bannister, on "Camborne and St. Meriasek."

September 11, *and three following days.* The National Association for the Promotion of Social Science. 16th Congress, at Plymouth; Lord Napier and Ettrick, President.

September 28. *Cornwall Gazette* publishes a Paper (read at the Plymouth Meeting of the Social Science Congress), by Mr. J. H. Collins, F.G.S., &c., on the Mineral Wealth of Cornwall.

October 10. *West Briton* records a recent discovery of Ancient Mining Tools in Penstruthal Mine.

October 14. Inauguration of the Davy Memorial at Penzance.—*Cornish Telegraph*, Oct. 16, contains a full account of the proceedings, and a biographic memoir of Sir Humphry Davy.

October 25 Royal Geological Society of Cornwall. 59th Annual Meeting, at Penzance; Mr. Warington Smyth, F.R.S., F.G.S., President, in the Chair. Among Papers read were the following: On the Mining Districts of Yorke's Peninsula, South Australia; Mr. S. Higgs, junr., F.G.S., F.G.S.C., &c. On the Bones of a Whale found at Pentewan; Professor Flower, F.R.S. On Fractured Flints; Mr. W. C. Borlase, F.S.A.

November 6. *Cornish Telegraph* records the capture of an *Octopus*, or Eight-armed Cuttle-Fish, by two Gorran fishermen.

November 6. *Cornish Telegraph* publishes a letter, from the Reverend Dr. Bannister, on the name "Phillack"; with names of patron saints of other Cornish parishes.

November 13. *Cornish Telegraph* publishes, from the Clarendon Papers, "The Parishes in Penwith in 1645, with a list of the summes weekly they pay, and also the names of their ministers."

November 14. *West Briton* publishes, under the head of "Cornish Watering Places, &c.," an account of "Mevagissey."

November 16. Oxford Local Examinations. Presentation of Prizes and Certificates at Truro, by the Bishop of Exeter.

November 19. Royal Institution of Cornwall. 54th Annual General Meeting; Mr. John St. Aubyn, M.P., President, in the Chair. In the evening, a Conversazione in the Institution Lecture-Room, Mr. A. Pendarves Vivian, M.P., presiding. (See *Journal of the Royal Institution of Cornwall*, No XIV., *and 55th Annual Report).*

November 21. *West Briton* publishes an extract from a review, in the *Journal of Applied Science*, of "The Life of Richard Trevithick, with an account of his inventions," by Francis Trevithick, C.E.

November 23. Death of Sir John Bowring, in the 81st year of his age, at Claremont, Exeter.

December 1. Death of Sir Edward St. Aubyn, Bart., of St. Michael's Mount, Cornwall, and Stoke Damerel, Devonshire.

December 4. *Cornish Telegraph* publishes a note of enquiry, from "E. H. W. Dunkin," concerning a Brass Cross, formerly in the chancel of Sithney Church, and inscribed to the memory of Roger Trewythynnyk.

December 7. *Cornwall Gazette* publishes a letter, from "Christopher Cooke," London, on "Helston in 1797."

In our *Chronological Memoranda* for 1871, under date *September* 22, there appeared a letter (taken from the *Western Morning News*) from Mr. Rogers, concerning Cones recently formed on a *Cedrus Deodara* at Penrose. Mr. Rogers has since written to us as follows:—

Owing to some inscrutable reason, the Autumn of 1871 was unusually favourable to the development of the fructification of rare Conifers; and I observed, as early as August 30, several small catkins on a *Cedrus Deodara* at Penrose, raised by my father from Indian cones sent him by Dr. Wallich, late Curator of the Botanic Garden at Calcutta. These catkins had at first the appearance of females, being erect, compact, and of the form which the female is represented as exhibiting. They gradually, however, increased in size, and developed into undoubted male catkins, shedding pollen abundantly, and remaining on the branches until the end of November, when all gradually fell off. Fully 200 catkins appeared on this one tree; but I could not discover any upon other specimens, nor have I been able to detect a single female.—Reports have reached me of the occurrence of male catkins on the Deodar, in 1871, at the following places:—at Enys (where a few female cones also appeared); at Pendrea, and Tremedden; in Devon, at Pontey's Nursery, and at Ham; also at Bristol, and at Mr. Murray's, Wimbledon, Surrey.—Dr. J. D. Hooker, Director of the Royal Botanic Gardens at Kew, informed Mrs. Enys that the Deodar has repeatedly ripened its cones in this country, and that there is now growing at Kew a fine young plant, some nine feet high, raised from seeds produced 12 or 15 years ago from a tree of Sir Thomas Acland's. Dr. Hooker adds that the occurrence of the female catkin on the *Cedrus Deodara* is comparatively rare in England.

WAIFS AND STRAYS.

I have a few Cornish trifles which may fill up a corner in our *Journal*, and thus be embalmed.

I have before me, in most excellent caligraphy of the probable age of Charles II.,

"A Medecine against the Plague

Take three pints of good Muscadine, and boile therein one handfull of Sage, one handful of Rue, till a pint be wasted: then straine it, and set it over the fire againe, and put thereto halfe an ounce of longe Pepper, as much Ginger, a quarter of an ounce of Nutmegge all beaten together, then let them boile a little, then put thereto half an ounce of Methridate, one ounce of Treakle, and a quarter of a pinte of good Aqua vita, or rather Angelica water."

The prescriber of this stiff stomachic quaintly adds:—

"Keep this as your Life above all worldly Treasures, and take it allwaies warm both Morneinge and Eveninge, a spooneful or two if already diseased and sweate there pon, but if not diseased, once a day a spoonefull is sufficient: in all the plague (under God), trust to this; it never failed Man, Woman, or Child if the Hart were not first cleane drowned in the disease. It is good against the Plague, Small Pox, Measells, Surfitts, and divers other the like diseases. Shake the bottle before you poure it out."

By the same hand, and equally neatly written, is the following:—

"Mortall wee are and subiect to diseases,
Wee all must dye even when and howe God pleases!
Into the world but one waye we doe come,
A thousand waies from hence wee are sent home.
Now that thou maist be kept from dangers all,
And that noe sickness or disease may fall
Vpon thy body, that heere thou maist have health,
And with it alsoe happinis and wealth;
That all the blessings that the earth can give
May be afforded thee whilst heere thou live
On earth, and when the tyme shall come
That thou must hence depart vnto thy home,
And leave this wretched world, and death shall saye
Soule take thy leave, thou must noe longer staye,
Heavens graunt that Angells thee may waite upon,

And safely thee convey unto the throne
Of joy and blisse, and that to Abraham's brest
Thou maiest be brought where quietly thou maist rest
To all eternity, where thou shalt have
More joy and blisse than I can wish or crave;
And nowe that this may unto thee be given
Shall be my Prayer unto the God of heaven,
And that thou maist be nowe and ever blest
Shall be the daily prayer of F. W.".

The last line gives a clue to the writer.

Campanology is a very interesting part of the Antiquary's studies, and *really scientific* bell-ringing is getting into well-deserved favour. I have collected heaps of belfry rhymes, laying down in wretched doggerel the rules of ringing. From the collation of all, I have made this modification, (but not alteration), of them, and present them to campanologists of the present day as not being needed for them, but as having been once required for their predecessors at the bell-rope.

BELFRY RULES.

These laws shall us in bonds of order tie,
And all who here shall ring must fain comply;
That he who curses, swears, or rudely brawls,
Or, moved by passion, names disgraceful calls,
Shall sixpence pay: and so shall he as well
Who, careless, ringing overturns a bell.
He who in belfry wears a hat or spur,
For such misdeed shall the same fine incur.
But he who roused, and in a choleric mood,
Shall strike or quarrel, though he draw no blood,
One shilling pays. These acts we all despise,
And hope such strife will never here arise.
Whoe'er shall damage do unto the tower,
To windows, locks; shall in that very hour
A seven and sixpence pay. We thus agree
With social hearts to keep good harmony.
All fines by rule shall in a box appear,
And its contents be known but once a year.

T. Q. C.

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To face Page 115 (Journal):—"A Plott of all the Coast of Cornwall and Devonshire."

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Tremenheere, H. Seymour, C.B., *London*	0	5	0
Tucker, C., *Exeter*	0	5	0
Tweedy, R.	0	5	0
Tweedy, W.	0	5	0
Whitley, N.	0	5	0
Whitley, H. M.	0	5	0
Williams, Sir F. M., Bart., M.P., *Goonvrea* ..	0	5	0
Willyams, A. C., *Bodrean*	0	5	0

The MUSEUM is open to Members and their families every day, except Sundays, between the hours of Ten and Four o'clock during the Winter, and between Nine and Six o'clock in the Summer.

The Museum is open to the public, free of charge, on the Afternoons of MONDAYS, WEDNESDAYS, and SATURDAYS, from Noon until dusk, during the Winter months, and until Six o'clock in the Summer months. On other days, and previous to Twelve o'clock on the above days, an admission fee of Sixpence is required.

An Annual Subscription of Five Shillings entitles the Subscriber to admission to the Museum on Mondays, Wednesdays, and Saturdays, and to attend all the Meetings of the Society.

A Subscription of Ten Shillings further entitles the Subscriber to introduce to the Museum and meetings all the *bonâ fide* resident members of his family.

A Subscription of One Guinea entitles the Subscriber to all the publications issued by the Institution, to admission to the Museum, for himself and family, on every day in the week, and to the meetings of the Society; and to ten transferable tickets of admission to the Museum whenever open.

The "JOURNAL OF THE ROYAL INSTITUTION OF CORNWALL" *will be forwarded free of charge to the members subscribing One Guinea Annually. To others it will be supplied on payment, in advance, of Three Shillings a year; or the several numbers may be obtained from the Curator, or from a Bookseller, at Four Shillings each.*

ROYAL INSTITUTION OF CORNWALL.

SPRING MEETING,

1873.

THIS Meeting was held, in the Library of the Institution, at noon on Friday the 16th of May. In the absence of the President, Sir John St. Aubyn, Bart., M.P., the Chair was occupied by Dr. Jago, F.R.S., a Vice-President; and there were also present, (besides many ladies):—Mr. R. Were Fox, F.R.S.; Mr. W. Jory Henwood, F.R.S.; Mr. Tweedy, Treasurer; Mr. F. V. Budge, Assistant Secretary; Dr. Barham, Rev. Dr. Bannister, Mr. Alexander Paull, and Mr. H. O. Remfry, Members of the Council; Rev. H. S. Slight, Rev. Allen Page Moor, Capt. Oliver, R.A., Mr. Reginald Rogers, Mr. Theodore Budd, Dr. Hudson, Mr. H. Spry Leverton, Mr. John James, Mr. S. Pascoe, Mr. R. N. Worth, Mr. D. G. Whitley.

The CHAIRMAN said he had heard with regret that the President, Sir John St. Aubyn, had found himself so circumstanced as to be unable to attend this Meeting; for, inasmuch as Mr. Seymour Tremenheere, the only Vice-President senior to himself, was also absent, it had devolved upon him to preside on this occasion; and thus the audience would have to dispense with a prepared address from the chair, as he could venture no further, as an introduction to the business of the day, than to endeavour in a cursory way to indicate how the Institutional events of the past year connected themselves with this day's proceedings, and the papers that would be read to-day, so far as their titles seemed to him to import, with the past doings of the society.

By reference to the Number of the *Journal of the Royal Institution of Cornwall* just issued, it would be seen that at the Spring Meeting of last year, the President had brought to their notice the Draft of a Bill for the Preservation of Ancient Monuments, on which the opinion of this and kindred societies had been

requested by Sir John Lubbock, preliminarily to his bringing such a measure into the House of Commons. As it then stood, many of its clauses were thought to be unacceptable, or of very questionable use. Since then the author had reconstructed his draft, with a view to obviate the objections raised against it in its first form; and the Council of this Institution had, in response to his appeal, petitioned Parliament in its favour, subject to the reservation that there was room for still further amendment; which act would be taken to mean little more than an approval of its preamble.

The Chairman next stated that the Institution had been invited to assist in promoting the success of the Meeting of the Royal Archæological Institute of Great Britain and Ireland, appointed to be held at Exeter from July 29th to August 5th inclusive; and their President had been selected to preside in the History Section. Moreover, they had been asked by the Exeter Committee to allow certain valuable rarities—among them the Gold Torque—to be removed from their Museum, to form part of a temporary museum forming at Exeter for inspection by the Archæologists; and the Council had consented, upon proper provision being made for the safe transport and custody of the articles lent. In connection with the Exeter Meeting there would be Excursions over Dartmoor, and shorter ones elsewhere; and, as many of the members of the Institution would wish to avail themselves of them, it had been determined by the Council to have no Excursion of their own this summer. Moreover, Cornwall would be visited this summer by the Institution of Mechanical Engineers, primarily under the auspices of the Polytechnic Society at Falmouth; but this Institution would of course be anxious to render any assistance in its power, though it was unfortunate that this visit of the Engineers would be taking place, for the most part, whilst the Archæologists were at Exeter.

Dr. Jago, in passing on to the chief purpose of the meeting, the reading of the Papers that had been entrusted to them, remarked that, although in such a Society as theirs it must usually happen that such papers must primarily deal with local phenomena, it by no means followed that these might not become a source of a wide reputation for those authors who bestowed due pains in exploring them. Of this fact there was ample evidence immediately before him. On the table was a valuable gift of shells &c. from Mr. W. P. Cocks, as a reminder of the many papers that had in former years been contributed to their Journal by this veteran naturalist, whose indefatigable researches, over a period of 30 years, in the neighbourhood of Falmouth, had caused his name to be indelibly written in the annals of marine fauna. The like, as the publica-

cations of this society showed, did Jonathan Couch and son on other portions of the Cornish coast; so did Sars and son to still greater depths off the steep coasts of Norway;* so that they were led to demur to the dictum of Forbes, that there was no life in the ocean at a greater depth than 300 fathoms; until at length the English Government had been induced to send such naturalists as Carpenter, Gwyn Jeffreys, and Wyville Thomson, in men-of-war, on those devious, deep-dredging expeditions which were astonishing the scientific world with the news that life, under favourable conditions, might exist at, perhaps, the utmost oceanic depth, and that beings were now daily being hauled up from the bottom of the sea, which were nearly related to forms that had been imagined by Geologists and Zoologists to have been extinct since the cretaceous and oölitic strata of the solid earth had been deposited. There would be a Paper too by Mr. Henwood, which would bring to their recollection that it was among the Cornish mines that he earned his spurs as an eminent geologist. Then again, in the Antiquarian department, one of their younger members, Mr. Copeland Borlase, by the publication of his *Nœnia Cornubiæ*, which had been done since they last met, had acquired for himself a general reputation as an archæologist, however much he might have wounded the prejudices of some, by labouring to explode the idea that certain of the sepulchral barrows in this county were of Celtic origin. Sir John Maclean, who had now contributed a Paper, had just completed his *History of Trigg Minor*, which was esteemed as a model of antiquarian research.

Lastly, this Institution could not forget their recent loss of an Honorary Member, one of the most illustrious of linguists, Dr. Edwin Norris, it being recorded of him that he was able to speak and write in some five-and-twenty languages. If Mezzofanti could converse in more tongues than Norris, the world owed far more to the latter, as a philologist, who had advanced our knowledge of at least three defunct languages of eastern peoples. From the old Cornish Tongue he had translated, if he remembered rightly, three Miracle Plays; and those members of this Institution who made his acquaintance on the occasion of the Cambrian Archæological Association's visit to Cornwall in 1862, would have a kindly remembrance of his simple and genial disposition. Since Norris's translations, another Cornish Miracle Play had come to light, in Wales, and had been rendered into English by Mr. Whitley Stokes of Dublin, as they would hear about from Dr.

* The Chairman here made reference to one of the books just presented to the Institution by the University of Christiania.

Bannister, the successful labourer in the field of old Cornish names, in the course of the meeting. But, gratifying as it was that remnants of Cornish literature had been rescued from oblivion, Dr. Jago held it to be fortunate that Cornish was no longer the living language of the county. Whether it were true or not, as he had read in last week's *Athenæum*, that there was a project afoot for translating Dickens's works into Welsh, for the benefit of a numerous population in this island who had hitherto been unable to read them, it was in every way an advantage to Cornish folk that they had adopted one of the great universal languages, which gave them ready access to other men's thoughts, and enabled them to communicate their own. Otherwise they would be much worse off than a small independent nation with a language of its own; and how such a people as this might feel themselves incommoded in this respect might be seen by a series of publications which had just been presented to the Institution by the University of Christiania, and produced by its learned professors. These were not all written in Norwegian, but, besides one joint statistical pamphlet by the Russian and Norwegian Governments, which was in French, there was one Essay printed in English and another in German, that they might gain the general circulation that they would not have attained in Norwegian.

Mr. F. V. BUDGE read the lists of Presents:—

DONATIONS TO THE MUSEUM.

Wood-Tin, from a depth of 200 fathoms; Metal Lode, Wheal Vor, Breage	Mr. William Argall.
Three Cannon Balls (two of iron, and one of stone), found at Carwinion	Mr. Reginald Rogers, Carwinion.
Part of a Cannon Ball, from the Alma battle-field	Mr. C. M. Barrett, Truro.
Six Arrows, brought from New Zealand in 1870, by Mr. Frederick Hele Tippett	Rev. Edward Tippett, Newquay.
Relic from the Chicago Fire	Mr. Hancock.
Ancient Carved Stone; dug, about 40 years since, from beneath the site of a house in Ferristown, Truro, when the ground was being excavated for its foundation. Supposed to have belonged to the St. Dominick Friary ..	Mr. Edward Sharp, jun., Truro.
Hamburg Coin, 1727*	Mr. Thomas Worth, Truro.

* Legend on the Obverse: Carolus VI. D. G. ROM. IMP. SEMP. AUG. On the Reverse: Hamburger Current. 1727. IIII SCHIL.

Collections of Insects, Shells, Eggs, and other objects in Natural History (*a*).....	Mr. W. P. Cocks, Falmouth.

ADDITIONS TO THE LIBRARY.

Parochial and Family History of the Deanery of Trigg Minor. Part VI., 1873. (Forrabury and Minster). With Indices to Vol. I.—By Sir John Maclean, F.S.A., Member of the Royal Archæological Institute of Great Britain and Ireland, Honorary Member of the Royal Institution of Cornwall, etc.....	Presented by Mr. Henwood, F.R.S., &c.
Annales de Chimie et de Physique, par MM. Chevreul, Dumas, Boussingault, Regnault, Wurtz, avec la collaboration de M. Bertin. 4me Série. (5 Nos., Janvier—Mai, 1873....	Ditto.
The London, Edinburgh, and Dublin Philosophical Magazine, and Journal of Science. Fourth Series. No. 295. December, 1872..	Ditto.
Remarques sur les Gisements Métallifères du Cornwall. Par William Jory Henwood, F.R.S., F.G.S., Président du Royal Institution of Cornwall;* Traduction par M. E. Morineau, ancien élève de l'Ecole des Mines; revue par M. Moissenet, ingénieur des mines	Ditto.

* Le mémoire original a été inséré au nº. 13 du Journal of the royal institution of Cornwall; les travaux antérieurs à ceux de l'auteur y sont l'objet de nombreuses citations, et l'auteur y signale l'important concours qui lui a été gracieusement offert par les agents des mines et les mineurs de tout le comté.

(*a*) These Collections comprised: Insects from South America, British and Foreign Shells, a bottle with "Garganum bacciferum," &c. Concerning the Shells, Mr. Williams Hockin, having examined them, writes as follows: "In addition to the collection of Foreign Shells, Mr. Cocks has obliged us by 85 species of recent British Shells, of which the following are new to our Museum:—

Marine:

1. Aplysia hybrida.
2. Bulla Crankii.
3. Ianthina communis.
4. Lamellaria tentaculata.
5. Mangelia gracilis.
6. ——— lævigata.
7. ——— scabra.
8. Pleurobranchus plumula.
9. Rissoa inconspicua.
10. Trochus millegranus.
11. Venus casina.

Freshwater:

1. Limnæus auricularius.
2. ——— truncatulus.
3. Planorbis glaber.
4. Pisidium pulchellum *(amphibious)*
5. Unio pictorum.

Land.

1. Azeca tridens.
2. Helix hispida.
3. —— revilata. (*Ran.*)
4. Pupa Anglica.
5. Vitrina pellucida.
6. Zonites alliarius.

Latham's Birds: A General Synopsis of Birds, Vol. I., Pt. 2, 1782. Ditto Vol. III, Pt. 2, 1785	From Mr. W. P. Cocks, Falmouth.
An Essay towards a Natural History of the Corallines, and other Marine Productions of the like kind, commonly found on the Coasts of Great Britain and Ireland. To which is added, The Description of a large Marine Polype taken near the North Pole, by the Whale-Fishers, in the Summer 1753. By John Ellis, F.R.S. 1755	Ditto.
Testacea Britannica, or Natural History of British Shells, Marine, Land, and Fresh-Water, including the most minute: systematically arranged and embellished with Figures, by George Montague, F.L.S.—1803. (Parts 1 and 2, in one volume)	Ditto.
The Gardeners Dictionary; containing the best and newest methods of cultivating and improving the Kitchen, Fruit, Flower Garden, and Nursery; as also for performing the practical parts of Agriculture, including the management of Vineyards, with the methods of making and preserving the wine, according to the present practice of the most skilful Vignerons in the several wine countries in Europe. Together with directions for propagating and improving, from real practice and experience, all sorts of Timber trees.—The Seventh Edition, revised and altered according to the latest system of Botany; and embellished with several Copper-Plates, which were not in the former Editions.—By Philip Miller, F.R.S., Gardener to the Worshipful Company of Apothecaries, at their Botanick Garden in Chelsea, and Member of the Botanick Academy at Florence.—MDCCLIX. (2 vols. fol.)	Ditto.
Twenty Portraits, engraved from Photographs..	Ditto.
Collins' Elementary Science Series. A First Book of Mineralogy. Adapted to the requirements of The Science and Art Department, and suitable for self-instruction. By J. H. Collins, F.G.S., Author of "A Handbook to the Mineralogy of Cornwall and Devon"; Secretary to the Royal Cornwall Polytechnic Society, Hon. Assistant Secretary to the Miners' Association of Cornwall and Devon, Associate of the Royal Geological Society of Cornwall, etc., etc.	From the Author.
The Dolmen Mounds and Amorpholithic Monuments of Brittany.—By S. P. Oliver, Capt. R.A., F.R.G.S., Corresponding Member Anthropological Institute	From the Author.

Historical Notes concerning the progress of mining skill in Devon and Cornwall. By R. N. Worth	From the Author.
Notes on the Site of the Palace of Kennington. (From the *Archæological Journal*, No. 114, A.D. 1872).—By Henry Mac-Lauchlan, F.G.S., Corr. Mem. Royal Institution of Cornwall	From the Author.
History and Antiquities of Kemsing Church, Kent. By E. H. W. Dunkin, Author of "Some Account of the Megalithic Remains in South Dorset"; "The Megalithic Remains in Mid-Kent"; &c., &c. (Reprinted from "The Reliquary, Quarterly Archæological Journal and Review")	From the Author.
Meteorology of West Cornwall and Scilly, 1872. (Reprinted from the 40th Annual Report of the Royal Cornwall Polytechnic Society) ..	From Mr. W. P. Dymond, Falmouth.
A Handy-Book of Rock Names, with Brief Descriptions of the Rocks.—By G. Henry Kinahan, Engineer Diplomatist, Trin. Coll. Dublin; Member of the Royal Irish Academy; Fellow of the Royal Geological Society, Ireland; of the Geological Survey of the United Kingdom; etc., etc.	From the Author.
A Plott of all the Coast of Cornwall and Devonshire, as they were to be fortified in 1588 against the Landing of any Enemy. Taken from the Original in the Cottonian Library*	From Mr. Henry Lee Rowett, Polperro.
Annual Report and Transactions of the Plymouth Institution and Devon and Cornwall Natural History Society. Vol. IV. Part III. 1871-72.—Appended is "The Three Towns Bibliotheca: A Catalogue of Books, Pamphlets, Papers, etc., written by natives thereof; published therein; or relating thereto; with Brief Biographical Notices of the Principal Authors. By R. N. Worth, Honorary Member of the Plymouth Institution.....	From the Institution.
Flora of Devon and Cornwall. By Isaiah W. N. Keys, Curator of Botany in the Plymouth Institution and Devon and Cornwall Natural History Society. Part V. Labiatæ—Characeæ. —Mosses of Devon and Cornwall. By E. M. Holmes and Francis Brent.—Scale Mosses, Liverworts, and Lichens of Devon and Cornwall. By E. M. Holmes	From the Plymouth Institution and Devon and Cornwall Natural History Society.

* See *Journal of the Royal Institution of Cornwall*, No. XIV.

The Journal of the Royal Historical and Archæological Association of Ireland. Vol. II. Fourth Series. July, 1872. No. 11.	
Ditto. October, 1872. No. 12...	From the Association.
The Journal of the Anthropological Institute of Great Britain and Ireland. Vol. II. No. III. January, 1873.....	From the Institute.
Proceedings of the Scientific Meetings of the Zoological Society of London. Index. 1861-1870	From the Society.
Proceedings of the Scientific Meetings of the Zoological Society of London. For the year 1872. Part II. March—June.....	Ditto.
Proceedings of the Society of Antiquaries of London. Second Series. ..... Vol. V. No. IV. June 8, 1871, to January 25, 1872..... Ditto No. V. January 25, to May 2, 1872 Ditto No. VI. May 2, 1872, to January 9, 1873	Ditto.
Transactions of the London and Middlesex Archæological Society. Part XII.—Part II of Volume IV.....	Ditto.
Journal of the Liverpool Polytechnic Society, December 21, 1872 .... January 18, 1873..... February 15, 1873 ..... March 17, 1873 ..... April 26, 1873	Ditto.
Proceedings of the Bath Natural History and Antiquarian Field Club. Vol. II. No. 4. 1873	From the Club.

From the University of Christiania:—

On some Remarkable Forms of Animal Life from the great deeps off the Norwegian Coast. I. Partly from Posthumous Manuscripts of the late Professor Dr. Michael Sars by George Ossian Sars. With 6 Copper-plates. 1872.

On the Rise of Land in Scandinavia. By S. A. Sexe. 1872.

Die Pflanzenwelt Norwegens. Ein Beitrag zur Natur- und Culturgeschichte Nord-Europas. Von Dr. F. C. Schübeler, Professor der Botanik an der Universität in Christiania. Mit 15 Karten und Illustrationen. 1873.

Forekomster af Kise i Visse Skifere i Norge, med 3 Plancher og Flere Træsnit. Af Amund Helland, Cand. min. og Amanuensis ved Universitetets metallurgiske Laboratorium. Udgivet ved E. B. Münster, Professor og Bestyrer af Universitetets metallurgiske Laboratorium. 1873.

Anden Beretning om Ladegaardsoens Hovedgaard. Forste Hefte. Med flere i texten indforte Xylografier. 1872.

Proveforelæsninger til Concurrence om den medicinske Professorpost. Marts 1873.

Beretning om hvad der til Ferskvandsfiskeriernes Fremme er udfort i Tidsrummet fra 1ste Oktober, 1871, til 1ste Oktober, 1872, af M. G. Hetting. 1873.

Ladegaardsoens Hovedgaards Samlinger af Bregner og Laver, fornemmelig fra Christianiadalen.

Geologisk Kart af Laver. Fortegnelse over del geologiske Lavkart.

Höidekart af Laver. Fortegnelse over Hoideangivelser om Christiania antydet ved Lav.

Cantate ved det Kongelige Norske Frederiks Universitets Mindefest for Hans Majestæt Kong Carl den 19de November 1872.

Rapport au Congrès International de Statistique de St. Pétersbourg sur l'Etat de la Statisque Officielle du Royaume de Norvège.

The following Papers were presented :—

On the Detrital Tin Ore of Cornwall.—By W. Jory Henwood, F.R.S., F.G.S., sometime Her Majesty's Assay-Master of Tin in the Duchy of Cornwall.

The Tin Trade of Cornwall in the reigns of Elizabeth and James I., compared with that of Edward I.—By Sir John Maclean, F.S.A.

On the occurrence of Wood-Tin Ore in the Wheal Metal lode at Wheal Vor in Breage.—By William Argall, Purser of the mine.

On Dynamite as an explosive agent, in its sanitary aspect.—By Dr. Hudson.

Old Glaciers in South-West Cornwall.—By Francis Lloyd.

On an ancient Miracle Play, recently discovered among some Welsh works.—By Rev. Dr. Bannister.

Romano-British, or Late Celtic, Remains at Trelan Bahow, St. Keverne, Cornwall; found about 1833.—By J. Jope Rogers, Penrose.

John de Trevisa.—A.D. 1342—1412. *(Supplemental Notice*).* —By J. Jope Rogers, Penrose.

On the Manor of Boyton and Barton of Bradridge, with some account of the Advowson of Boyton.—By E. H. W. Dunkin, Kidbrooke, Blackheath.

Notes on the Ornithology of Cornwall, from May, 1872.—By E. Hearle Rodd.

The Common Seals of Cornwall.—By R. N. Worth, Plymouth; Corresponding Member of the Institution.

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* See *Journal of the Royal Institution of Cornwall,* No. XI, and 51*st Annual Report*, p. xix.

On the reading of Mr. Henwood's Paper on Detrital Tin Ore, Dr. BARHAM remarked that the record it contained, together with others brought before the Institution some time since, appeared to be confirmatory of an opinion that formerly the proportion of stream-tin from Devonshire, as compared with Cornwall, was much greater than in recent times; notices had also been received of some remains of supposed ancient tin-works west of Dartmoor. —Mr. HENWOOD remembered that Sir Edward Smirke produced here some accounts which led to the same conclusion.

With reference to a part of Sir John Maclean's Paper on the ancient Tin Trade of Cornwall, Mr. HENWOOD wished to make a remark, which he would endeavour at some future time to expand. In addition to the duty of 1s. $6\frac{3}{4}$d. per 112lbs. in Devon, and 4s. per 120lbs. in Cornwall, the Duchy also received other sums which were charged as for "great pieces," and which sums he had no doubt were charged as a fine on those persons who sent blocks that were not admissible. There was also a charge in respect of "white rent," and which he was unable to explain.

Dr. BARHAM asked if there was any evidence as to the weight of blocks at that time. The weight of most of the Jews' House blocks in the county had been ascertained.

Mr. HENWOOD did not think there was anything like either a prevalent, or average, weight of the masses of Jews'-house tin; but, generally speaking, they were of very good quality indeed. Some time since, a specimen of Jews'-house tin was given him by Mr. Petherick, of St. Austell; it was found near that town; and he believed he had presented it to this Museum in the donor's name. In it there were particles of tin ore and charcoal agglomerated in a cement of metallic tin; shewing that the process had been discontinued whilst only part of the ore had been converted into metal.

Dr. BARHAM said it would be recollected that Mr. Poole, of the British Museum, had ascertained that the unique block in this Museum, on which Sir Henry James had written, and which had been called the Astragalus of Tin, from its resemblance to the form of the ancient blocks described by Diodorus Siculus, weighs 158lbs. and that our fine specimen of Jews'-house tin weighs $39\frac{1}{2}$ lbs., exactly one fourth of the former, which corresponds with two talents of the later Æginetan or Commercial Attic scale; and he drew an inference from this conformity of weights in favour of the story of Phœnician trade with Britain. With reference to the particles mentioned by Mr. Henwood, it occurred to him that possibly the ore was smelted into casual moulds of clay, and that thus loose particles got attached to the bottom of the smelted metal.

Mr. HENWOOD believed that some masses of tin which looked very much like weights, had been found near St. Austell; and that they were mentioned and figured in Borlase's *Natural History of Cornwall.* He remembered the opinion given by Mr. Poole as to the correspondence, in weights; but he was afraid that the evidence which he should have to adduce, would not bear out the theory; though he would not at present say so positively. He believed, however, that the weights were not multiples of the Attic, as had been supposed.

Dr. BARHAM believed that Mr. Poole affirmed that some of the blocks weighed, respectively, a talent and a half talent.

Dr. BARHAM read the following paper and tabulated results from Mr. DYMOND, of Falmouth:—

Comparison of the Temperatures of the Air and Sea at Falmouth in 1872.

Observations on the Temperature of the Sea at Falmouth were commenced in the Autumn of 1871 and were continued throughout the following year, and I am therefore enabled to give the results of one year's work. It was at first proposed to make the Observations in Falmouth Harbour, about the time of High Water; but it soon became apparent that results obtained in the Harbour, or near the shore, were almost worthless. Experiment proved that a difference of several degrees of Temperature existed within very small limits of space, and it was therefore determined before the end of 1871 to make the observations in the open sea, at distances varying from half a mile to three or more miles from the nearest land. Probably about one mile would be pretty nearly the average distance of the point of observation from the shore. During the months of January, February, and March, the number of observations averaged 16 per month, but subsequently the average was nearly 26 per month. The variation of temperature from day to day being exceedingly small (only once amounting to 2°), this number of observations may be considered ample to give satisfactory results. The instrument employed is a "Standard" by Casella, tested at Kew, and was immersed to a depth of 6 feet below the surface, being suspended for a sufficient time at that depth by means of a float. The copper case of the instrument brings up water in which the bulb remains immersed whilst the reading is taken.

In the following Table are given the results of the observations; and the corresponding air temperatures, as recorded at the Falmouth Observatory, are added, with columns of differences. The sign *minus* is prefixed when the sea temperature is less than that of the air, and the sign *plus* when it is greater.

In every month the maximum temperature of the sea was less than that of the air, the greatest difference being 10°·7 in June, and the least 2°·3 in November; the mean difference between the monthly maxima was 6°·3. On the other hand the minimum temperature of the sea was in every month very considerably higher than that of the air, the largest excess being 16°·3 in March (which was a very cold month on land), and the least 6° in June and July. The mean difference between the minimum temperatures was 11°·5, being nearly double that between the mean maxima.

As regards the mean temperatures it will be observed that the sea was warmer than the air in every month except June and July, when it was 1°·5 and 0°·9 colder. Speaking generally, the air and sea had nearly the same mean temperatures from May to September inclusive, the difference in those

months being less than 2°, whilst in winter the sea was considerably warmer than the air. For the whole year the mean temperature of the air was 51°·7 and that of the sea 53°·9, the difference being 2°·2.

As was to be expected the greatest contrast is observed when the range of temperature is considered. Thus the mean monthly range of the temperature of the air was 21°·3, whilst that of the sea was only 3°·5. The monthly range of sea temperature was much larger in summer than in winter, as was also that of the air, though in a less ratio. The highest air temperature during the year was 71°·4 in July, and the lowest 34°·7 in December, the difference being 36°·7. The highest sea temperature was 63° in July and August, and the lowest 47°·5 in January, the difference being 15°·5.

It is obviously difficult, if not impossible, to estimate precisely the effect of an extended area of water having a surface temperature so different from that of the adjacent air; or to determine what the temperature of the air at Falmouth would be if the sea were removed to a distance. The figures in the Table however would appear to support the conclusion that the influence of the sea in controlling the temperature of the neighbouring air is greater by raising it in winter than by depressing it in summer.

Temperatures of the Air and Sea at Falmouth.

[The *minus* sign is prefixed when the Temp. of the Sea is less than that of the Air, and the *plus* sign when it is greater.]

Date. 1872.	Maximum.			Minimum.			Mean.		
	Air	Sea	Diff.	Air	Sea	Diff.	Air	Sea	Diff.
Jan...	53·2	50·0	—3·2	37·0	47·5	+ 10·5	45·9	49·3	+ 3·4
Feb...	55·5	50·0	—5.5	40·4	48·5	+ 8·1	47·6	49·3	+ 1·7
Mar. .	57·1	51·5	—5·6	32·7	49·0	+ 16·3	46·9	50·2	+ 3·3
Apl...	58·8	52·0	—6·8	36·8	49·0	+ 12·2	48·2	50·9	+ 2·7
May..	63·1	53·5	—9·6	36·6	50·5	+ 13·9	50·4	52·0	+ 1·6
June .	70·2	59·5	—10·7	46·0	52·0	+ 6·0	56·6	55·1	— 1·5
July..	71·4	63·0	—8·4	51·5	57·5	+ 6·0	61·4	60·3	— 0·9
Aug. .	71·0	63·0	—8·0	51·0	58·5	+ 7·5	60·7	61·6	+ 0·9
Sep...	68·9	61·5	—7·4	43·7	57·5	+ 13·8	57·8	59·6	+ 1·8
Oct...	61·6	57·0	—4·6	40·5	54·0	+ 13·5	50·3	55·4	+ 5·1
Nov. .	57·3	55·0	—2·3	36·5	51·0	+ 14·5	48·0	52·7	+ 4·7
Dec. .	54·9	51·0	—3·9	34·7	50·0	+ 15·3	46·8	50·3	+ 3·5
Means	61·9	55·6	—6·3	40·6	52·1	+ 11·5	51·7	53·9	+ 2·2

Dr. Barham also exhibited and remarked on diagrams* showing the very considerable difference between the temperature marked by means of instruments placed on grass or but a few inches above ground, and those placed at the usual elevation of about 5 feet. Mr. R. W. Fox had furnished him with results of observations at Penjerrick, at a height of about 200 feet above the sea, the Observatory at Falmouth being only about 100 feet; and observations had also been kindly forwarded from Helston by Mr. Moyle, and from Bodmin by Captain Liddell. One of the Tables gave daily observations for the month of April last, when the weather was dry with a clear sky, well calculated to bring out the differences of temperature between the air "at grass" and that at a higher elevation. The other diagram represented the monthly means and extremes for the year 1872. It was important to remark the very great differences between Falmouth and Penjerrick even in April; in one instance no less than 18 degrees, and there were several instances of such differences as 15, 12, and 10 degrees; and very similar results were observed at Bodmin and Helston. The practical importance of all this was very great indeed, because it was the temperature at grass that affected vegetation; so that while at Falmouth Observatory the recorded temperature was 48°, a very safe temperature for vegetables, at Penjerrick, on the grass, it was as low as 30°—a coldness which might be destructive of vegetation. In one instance, in 1872, the surface temperature at Penjerrick was as low as 18°,—14 below zero, at a time when at this Institution the temperature was 26°. It was of very great importance that a knowledge of such facts should be widely diffused, in order that contrivances might be employed to counteract the injurious effects of extreme cold. The main object to be aimed at was to prevent radiation of heat from the earth's surface.

A letter, dated 14th May, 1873, from Mr. N. Hare, junr., Liskeard, an Associate of the Institution, recorded the following Ornithological incidents in the vicinity of that town:

"I have just been shown a Ruff *(Machetes pugnax)* which was shot last March, whilst feeding in a marsh at Tremabe in this parish. Though plentiful in the great fens of the Midland Counties, the Ruff appears to be of rare occurrence with us. The Game-dealer to whom it was brought, and who has been in the business all his life-time, told me that he had never seen one before. He was informed that the bird was a Sandpiper; but its yellow legs led him to think otherwise, and he sent it to a bird-stuffer to be mounted. The plumage of this specimen is of a lighter colour than usual, and the spots on the breast are few and indistinct; indicating, perhaps, a bird of last season.

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* See Diagrams at the end of *Journal*, No. XV.

"A Thrush (*T. musicus*) lately came under my notice, of a uniform pale-buff colour, which gave it an odd appearance. Yarrell mentions that varieties in colour are not uncommon.

"About the same time a Hawfinch (*C. vulgaris*) was sent from Linkinhorne, to Mr. Ough, animal preserver, at Liskeard. This is the third or fourth specimen killed in this neighbourhood, of late years.

"I may also mention that in January, 1871, an American Bittern (*B. lentiginosus*) was shot at Woodhill in Liskeard, by Mr. Wm. Downing, who still has it. Particulars appeared at the time in the "Field" newspaper. Mr. E. H. Rodd, in a list of British Birds as a guide to the Ornithology of Cornwall, published in 1850 in the *Transactions of the Penzance Natural History and Antiquarian Society*, says of the bird: "Not Cornish; reported to have been killed in Cornwall, but no instance authenticated; very rare as a British bird." Mr. Doney, who mounted the Bittern, showed me also a Red Grouse (*T. Scoticus*), a female, which he had then lately received from the neighbourhood of Broadoak. Of this bird, Mr. Rodd remarks: "Not Cornish, nor is it found in any of the Southern or Western Counties."

"A week or two later, Mr. Doney brought me a Hooded Crow (*Corvus cornix*); and in April following, a Greater Spotted Woodpecker (*P. major*), and a Hoopoe (*U. epops*) obtained from Warleggan. These birds are also of sufficient rarity with us to warrant my mentioning them."

On motion by Mr. TWEEDY, seconded by REV. H. S. SLIGHT, thanks were voted to the contributors of Papers and other communications, and to the donors to the Museum and the Library.—Thanks were also voted to DR. JAGO, on a proposition from Mr. H. O. REMFRY, seconded by Mr. PASCOE, for the ability with which he had presided over the proceedings of the Meeting.

A QUADRUPLE RAINBOW.—The following communication from Mr. R. N. WORTH, was presented to the Institution at its Spring Meeting, in 1872.

On the 15th October, the day of the inauguration of the Davy Memorial at Penzance, I had the good fortune to see the phenomenon of supplementary or supernumerary rainbows. About half-past 10 in the morning, whilst proceeding up North Street, towards the Cattle Market, the sky being about three-fourths covered with cloud, my attention was attracted by the unusual breadth of a rainbow which appeared directly in front. This was the primary bow; and, while I was looking at it, the secondary arc became visible. I then had before me a quadruple rainbow,—namely primary and secondary bows of the usual type; and, immediately within the primary bow, and to all appearance touching it, a couple of supplementary bows, each about half the width of the ordinary ones. It is stated that these supplementary bows are red and green, and certainly those that I saw had at a cursory glance that appearance. More exact scrutiny however gave me the impression that the reduced width of the innermost bows was caused by an overlapping of the different parts of the spectrum, by which the colours were so confused and blended, moreover, that the red and green effect was produced. The primary bow was of the ordinary brightness; the supplementary ones about equal in distinctness to the secondary. The phenomenon was of brief duration, lasting only a few minutes.

FIFTY-FIFTH ANNUAL GENERAL MEETING

OF THE

ROYAL INSTITUTION OF CORNWALL,

Held on Tuesday, November 18th, 1873.

This Meeting was held in the Institution Lecture-Room, and there were present:—Sir John St. Aubyn, Bart., M.P., President; Dr. Barham, Dr. Jago, F.R.S., Rev. C. M. Edward Collins, Rev. J. R. Cornish, Rev. H. S. Slight, Rev. J. J. Wilkinson, Commander Liddell, R.N., Dr. C. Le Neve Foster, Mr. Whitley, Mr. F. V. Budge, Mr. Tweedy, Mr. J. H. Collins, F.G.S., Major Parkyn, Mr. H. Spry Leverton, Mr. Reginald Rogers, Mr. Alexander Paull, Mr. R. H. Carter, Mr. R. N. Worth, Mr. B. Kitto.

THE COUNCIL'S REPORT.

Although the history of this Institution during the past year presents few events of novel or remarkable interest, the retrospect may on the whole be considered satisfactory, as it has fully maintained its activity and usefulness, and has gained a slight accession to the number of its Members.

Our Society has lost only two of its Members by death during the past year. Of these, Mr. John Waters had but lately joined us. The loss of the Rev. John Bannister, LL.D. of Trinity College, Dublin, calls for more extended notice. He was taken from us unexpectedly in his 58th year, was a Yorkshireman by birth, and did not come into this County till 1857, when he was appointed to the then Perpetual Curacy of Saint Day. He had not long pursued his clerical duties in that neighbourhood before he became impressed with the idea that much of the long-ago unspoken "Celtic vernacular of Cornwall," which would otherwise be lost to linguistic science, might be rescued from oblivion by a more exhaustive analysis than previous Antiquaries had attempted, of the names of places and persons that have prevailed in the County. All imaginable sources, whether oral, manuscript, or printed, were resorted to by him in quest of such names, through

many laborious years, until in 1871 his "Glossary of Cornish Names" was got through the press. Under what tedious difficulties the 20,000 names in it were collected and collated, and the derivations of the majority quoted or suggested, may be gathered from the singularly modest preface to the work. Yet no sooner had the ingenious Author freed his hands from this task than he commenced to assort other materials for an early appendix to it. All this while he had in contemplation the publication of an Anglo-Cornubian Dictionary, as a companion to the Cornubio-English Dictionary by the Rev. Dr. Williams, and had made plentiful notes with this view in an interleaved copy of this well-known work, which notes, it is to be hoped, may fall into the hands of some scholar competent to render them available for their original purpose. Finally, Dr. Bannister had long been an active Member and friend of this Insititution. He contributed to its Journal, spoke at its meetings, joined in its excursions, and assisted diligently in its management as a Member of the Council.

At the beginning of the last financial year there was a balance in the hands of the Treasurer of £77. 12s. 2d. At its close the balance in favour of the Institution was £24. 15s. 3d. This difference is more than accounted for by the fact that the printing of the Journal for the previous year, amounting to £58. 19s. 6d., is included in the expenditure, as well as the cost of the last number. The expenditure includes a rather large item (£15) paid to Mr. Vingoe for cleaning and refitting the cases in the Museum. This work had been reported on as necessary for some years past, and its execution had been delayed solely on account of the cost. A minute examination of the specimens shewed that many of them were not worth any attempts at preservation; and it is to be hoped that the kindness of donors will replace them satisfactorily.

We are again indebted to Mr. Williams Hockin for perfecting the classified arrangement of the collection of British Shells, and also for rendering it more complete through the exchange of our duplicates for varieties not before in our possession. Our thanks are also due to Mr. Collins for continued attention to our Minerals.

Independently of the families of Members 6148 individuals have visited the Museum during the year ending with July last. Of these 116 were admitted by payment, 136 by ticket, and the remaining 5896 were free.

It was stated in the Report for 1871 that the publication of two numbers of the Journal annually, as in the earlier years of its issue, had been discussed, but that the conclusion had been unwillingly arrived at that the funds available for the purpose were not sufficient to justify the attempt. It has, however, been felt that it is of great importance to the welfare and usefulness of this

Institution, and moreover an act of justice to those who contribute to its Transactions, that the papers communicated to them, and that the Proceedings at the Meetings, should be issued to the Members and to the public in an authentic form as soon as possible. In the case of every form of discovery and invention this is but fair to the author, in an age when the delay of a few months may transfer to another the credit really due to himself; and, in regard to subjects still open to discussion, it is highly desirable that there shall be an interval between the publication of the arguments on one side of a case, and the next Meeting of the Society, long enough to allow those holding different views to prepare a deliberate statement on the other side. Impressed with these reasons for the speedy issue of the publications of the Institution, and bound at the same time to avoid material additions to their cost, the Council would recommend that the experiment be tried of issuing the Journal which will contain the papers presented at the Spring Meeting and its Proceedings, about August or September, and the Report of the Council, with the matters of business transacted at the Annual Meeting, together with the Meteorological and other serial returns, as soon as possible after the beginning of each year. This scheme does not involve the necessity of any increase in the bulk of our printings; entailing only a trifling outlay for postage and extra covers. The printing of the next number of the Journal is so nearly completed that, with your sanction, it will be issued within a few weeks. Its contents will fully maintain the credit gained by the Institution from the preceding numbers, among which the last ranks high. We are again indebted to our late President, Mr. Henwood, for making our Society the medium of conveying to the public the results of the researches of a laborious lifetime in fields with which it may be safely asserted that he is better acquainted than any other man.

The Archæological Institute of Great Britain having fixed on Exeter as its centre of Meeting this year, it was considered advisable to regard the Excursions arranged by it as sufficient and attractive substitutes for the pleasant picnics carried out for some years past under the auspices of this Institution; and which, it is hoped, may be hereafter resumed.

The Meteorological Observations have been recorded, discussed, and transmitted to Mr. Glaisher for the public service, by Mr. Newcombe, with his accustomed accuracy. A series of special observations has been conducted by some of your Members, and is still in progress, with the purpose of ascertaining the effects of shelter on surface temperature,—a matter of practical as well as scientific interest, having a direct bearing on the security of our early vegetables.

The facilities afforded within these walls have been repeatedly turned to account for the promotion of instruction in science; and your Council regret that a recent proposal to open a class in Chemistry, which they desired to encourage, has not proved successful. You will, no doubt, readily sanction the lending of such aid as the resources of the Institution can furnish to the assistance of scientific teaching.

The duties of the Secretary of this Institution are often onerous, and your Council feel that they cannot adequately express the debt owed to Mr. Whitley for his long-continued services in that capacity. He has for some time past been without a colleague; but we have now the satisfaction of being allowed to propose that Mr. Budge, who has kindly acted as Assistant Secretary during the last year, shall be associated with him.

The office of Treasurer has been filled for many years by Mr. Tweedy with great advantage to the Institution: he now retires from it, and you will unite with your Council in tendering to him our best thanks for the attention he has so long given to our financial interests, and in placing him among our Vice-Presidents. We shall have the satisfaction of being allowed to propose his son, Mr. William Tweedy, as his successor in the Treasurship.

You will readily unite with your Council in gratefully acknowledging our obligations to Sir John St. Aubyn for filling as he has done the Presidential Chair during the biennial term to which its holding is limited, and which expires to-day. We beg to propose his election as a Vice-President. It is highly gratifying to your Council to be permitted to ask you to nominate Dr. Jago as his successor. His recognized position as a man of science will reflect credit on our Society whilst he is its head; but the appointment may also serve as a slight recognition of many years of service in the working post of Secretary.

The Council's Report having been read by Mr. F. V. Budge, it was resolved unanimously, that it be received, adopted, and printed.

The following resolutions were passed unanimously:—

That the thanks of the Society be given to the Officers and Council for their services during the past year; and that the following gentlemen form the Council for the ensuing year:—

President, Mr. JAMES JAGO, M.D. Oxon., F.R.S.

Vice-Presidents.

Lieut.-Col. Tremayne,
Mr. A. Pendarves Vivian, M.P.,
Mr. Jonathan Rashleigh,
Sir John St. Aubyn, Bart., M.P.,
Mr. Tweedy.

Mr. William Tweedy, *Treasurer.*

Secretaries: Mr. Whitley *and* Mr. F. V. Budge.

Assistant Secretary: Mr. W. G. Dix.

Other Members:—

C. Barham, M.D., Cantab.,
Mr. W. Copeland Borlase, F.S.A.,
Rev. J. R. Cornish,
Rev. W. Iago,
Mr. A. Paull,
Mr. W. J. Rawlings,
Mr. H. O. Remfry,
Mr. H. Spry Leverton,
C. Le Neve Foster, D. Sc. (Lond.), F.G.S.,
Mr. Tyerman,

and The Mayor of Truro.

Local Secretaries. { *Bodmin*, Mr. T. Q. Couch, F.S.A.
Truro, Mr. Alexander Paull.
London, Mr. Michell Whitley.

That the cordial thanks of this Meeting be given to those gentlemen who have favoured the Institution with Papers or other communications in the course of the year; and also to the Donors to the Library and Museum.

Mr. Budge read the List of Presents:—

DONATIONS TO THE MUSEUM.

Tin Stone; Park Mines, St. Enoder ..... Dr. Clement Le Neve Foster.

An ancient Gold Weight,* found imbedded in sand and gravel, at Luxulyan..... Mr. W. Petherick, St. Austell.

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* Weight 6 dwts. 8 grs. Diameter, $\frac{3}{4}$ in. Thickness $\frac{3}{16}$ in.—*obv.* Profile of James I, to waist, in armour, crowned; in his right hand a sceptre, in his left the orb. Legend, I. R. MA. BRIT. *Rev.* Beneath a crown, ·XXII·
·S· Henfrey records that in the Fourth Issue, 9th Year, of James I, the value of all the gold coins was raised 10 per cent. by proclamation; and that this was done to make them of equal value with the price of gold in foreign countries; for the unit, which was current in England at 20s., was valued abroad at 22s., and the other coins in proportion; therefore the Unit was declared current for 22s.

Cerussite (Carbonate of Lead) from Upper Treamble Mine, Perranzabuloe	Mr. J. H. Collins, F.G.S.
Two Specimens of the Saw Fish *(Pristis Antiquorum)*, from the Indian Ocean	Mr. Hamilton James.
Asbestos, from the Island of Beta, North of Scotland	Mr. P. Sambell, Falmouth.
The Idol Juggernaut, from Hindostan, formerly owned by Rev. J. Medley, St. John's, Truro, (now Bishop of Fredericton)	Ditto.
An Iron Crucifix, dug up in 1825—6, from the foundations of Old London-Bridge....	Ditto.
A Kaffir Water-Bottle, from the Cape of Good Hope	Ditto.
Fifteen Drawings, for the construction of Ships	Ditto.
Three Models of parts of Ships, in frame ..	Ditto.

ADDITIONS TO THE LIBRARY.

Lexicon Cornu-Britannicum: A Dictionary of the Ancient Celtic Language of Cornwall, in which the words are elucidated by Copious Examples from the Cornish Works now remaining; with Translations in English. The Synonyms are also given in the cognate dialects of Welsh, Armoric, Irish, Gaelic, and Manx; shewing at one view the connexion between them. By the Rev. Robert Williams, M.A., Ch. Ch. Oxford, P.C. of Llangadwaladr, and Rhydycroesau, Denbighshire. MDCCCLXV*.....	From Mrs. Bannister, St. Day.
Parochial and Family History of the Deanery of Trigg Minor. Part vii, 1873, (Helland). By Sir John Maclean, F.S.A., Member of the Archæological Institute of Great Britain and Ireland, Honorary Member of the Royal Institution of Cornwall, etc.	Presented by Mr. Henwood, F.R.S.
Annales de Chimie et de Physique, par MM. Chevreul, Dumas, Boussingault, Regnault, Wurtz, avec la collaboration de M. Bertin. 4me Série (6 Nos. Juin—Novembre, 1873..	Ditto.
The Old Glaciers of Switzerland and North Wales. By A. C. Ramsey, F.R.S. and F.G.S. Local Director of the Geological Survey of Great Britain, and Professor of Geology in the Government School of Mines	From Mr. Francis Lloyd.
Vienna Universal Exhibition, 1873. India Department.—Catalogue of the Collection contributed by the Geological Survey of India, under the direction of Dr. Oldham..	From Dr. Oldham.

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* This volume is interleaved, and it contains numerous MS. additions and annotations by the late Dr. Bannister.

On the Genus *Boswellia*, with descriptions and figures of Three New Species. By George Birdwood, M.D. Edin., India Museum, London	From the Author.
Basil Valentine his Triumphant Chariot of Antimony, with Annotations of Theodore Kirkringius, M.D. With The True Book of the Learned Synesius a Greek Abbot taken out of the Emperour's Library, concerning the Philosopher's Stone, 1678	From Mr. F. W. P. Jago, Plymouth.
Nicholas Flammel, His Exposition of the Hieroglyphicall Figures which he caused to bee painted vpon an Arch in St. Innocents Church-yard, in Paris. Together with The secret Booke of Artephivs, and The Epistle of Iohn Pontanus: Concerning both the Theoricke and the Practicke of the Philosopher's Stone. Faithfully, and (as the Maiesty of the thing requireth) religiously done into English out of the French and Latine Copies. By Eirenævs brandus, *qui est, Vera veris enodans*	Ditto.
Copy of a Report on the subject of the Landslips in the Salt Districts, made to Her Majesty's Secretary of State for the Home Department by Joseph Dickinson, Esquire, F.G.S., Inspector of Mines.....	From the Author.
The Shipbuilder's Repository; or, a Treatise on Marine Architecture. (Dedicated to the Right Honourable Lord Viscount Howe, First Lord Commissioner of the Admiralty.	From Mr. Philip Sambell, Falmouth.
The Journal of the Historical and Archæological Association of Ireland. Vol. I. Third Series. October, 1869. No. 8.	From the Association.
The Journal of the Royal Historical and Archæological Association of Ireland. Vol. II. Fourth Series ..... January, 1873. No. 13. ..... April, 1873. No. 14. ..... July, 1873. No. 15.	Ditto.
The Miners' Association of Cornwall and Devon. Reports and Proceedings for the year 1872-3.....	Ditto.
Annual Report and Transactions of the Plymouth Institution and Devon and Cornwall Natural History Society. Volume IV. Part IV. 1872-3	From the Institution.
Journal of the Anthropological Institute of Great Britain and Ireland. Vol. III. No. I. April, 1873	From the Institute.
Proceedings of the Society of Antiquaries of London. Second Series. Vol. V. No. VII. January 9 to January 30, 1873	From the Society.

Proceedings of the Society of Antiquaries of London. Second Series. Vol. V. No. VIII. January 30 to April 3, 1873, with Index to Vol. V.	From the Society.
The Fortieth Annual Report of the Royal Cornwall Polytechnic Society, 1872	Ditto.
Journal of the Royal Geological Society of Ireland. Vol. XIII. Part 3. Vol. III. Part 3, (New Series), 1872-73	Ditto.
Proceedings of the Philosophical Society of Glasgow. Vol. VIII. No. 2. 1872-73....	Ditto.
Transactions of the Geological Society of Glasgow. Vol. IV. Part II. 1873	Ditto.
Proceedings of the Scientific Meetings of the Zoological Society of London. For the year 1872. Part III, June—December....	Ditto.
Transactions of the Edinburgh Zoological Society. Vol. II. Part II. Session 1872-73	Ditto.
Society of Antiquaries of London. Exhibition of Bronze Implements and Weapons. January, 1873	Ditto.
Journal of the Liverpool Polytechnic Society. May 24, 1873. ..... October 25, 1873.	Ditto.
Proceedings of the Literary and Philosophical Society of Liverpool, during the Sixty-First Session, 1871-72. No. xxvi; with Index to Vols. I to XXV.	Ditto.
Proceedings of the Liverpool Naturalists' Field Club, for the year 1872-3	From the Club.

From the Commissioners of Patents:—

Chronological and Descriptive Index of Patents applied for and Patents granted, containing the Abridgments of Provisional and Complete Specifications.

Weekly Numbers, from May 11 to Dec. 31, 1871.
Ditto from Jany. 1 to Sept. 7, 1872.

*Abridgments of Specifications:—**

Artists' Instruments and Materials. A.D. 1618—1866.
Bleaching, Dyeing, and Printing Calico and other Fabrics, and Yarns. Part ii. A.D. 1858—1866.
Brushing and Sweeping. A.D. 1699—1866.
Farriery. A.D. 1719—1866.
Hinges, Hinge Joints, and Door Springs. A.D. 1775—1866.
Marine Propulsion (excluding Sails). Part iv. A.D. 1857—1866.
Medicine, Surgery, and Dentistry. A.D. 1620—1866.
Nails, Rivets, Bolts, Screws, Nuts, and Washers. A.D. 1618—1866.
Oils, Fats, Lubricants, Candles, and Soap. A.D. 1617—1866.

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* See *Journal of the Royal Institution of Cornwall*, No. xiv, April, 1873.

Paints, Colours, and Varnishes. A.D. 1618—1866.
Paper, Pasteboard, and Papier Maché. Part ii. A.D. 1858—1866.
Photography. Part ii. A.D. 1860—1866.
Plating or Coating Metals with Metals. Part ii. A.D. 1861—1866.
Preparing and Cutting Cork; Bottling Liquids; Securing and Opening Bottles, &c. A.D. 1777—1866.
Railways. A.D. 1803—1866.
Raising, Lowering, and Weighing. A.D. 1617—1866.
Sewing and Embroidering. A.D. 1755—1866.
Skins, Hides, and Leather. A.D. 1627—1866.
Steam Engine. Part ii. Vol. i. A.D. 1860—1866.
Ditto Part ii. Vol. ii. A.D. 1860—1866.
Sugar. A.D. 1663—1866.
Toys, Games and Exercises. A.D. 1672—1866.
Ventilation. A.D. 1632—1866.

Rev. C. M. E. COLLINS, after speaking on the importance of forming, at this Institution, a Collection of Manuscripts connected with the published Histories of Cornwall, stated that, some two or three years since, he hoped he should be able to obtain the most valuable of these MSS.,—that of Hals. He had, however, been granted permission to show it at the Conversazione this evening; and he urged that some effort should be made to secure it for this Institution. It was now the property of Mr. Stokes, of Bodmin, into whose possession it came from the late Mrs. Taunton, a daughter of Whitaker, the historian;* and it was understood that Mr. Stokes had received liberal offers for it, and that Sir John Maclean and the Reverend Mr. Maskell had each offered as much as 100 guineas.—Mr. COLLINS went on to state that he had also with him a volume of Tonkin's Manuscripts, which had been given to this Institution by the Reverend Mr. Pye, the Rector of Blisland, to whom they had been handed down. Sir John Maclean was at present using them; but they were the property of the Institution. Mr. COLLINS added that he had himself found some MS. scraps by Tonkin, at Trewardale, including a copy of satirical verses on the then Sir John St. Aubyn.—The reverend gentleman next stated that, a few days previously, Mr. Polsue, of Bodmin, informed him that, not many

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* Davies Gilbert, in the Preface to his Parochial History, states that the Manuscript, after a long and mysterious disappearance, was recovered by Mr. Whitaker, from a bookseller at Exeter, who had retained the papers as a pledge for some debt; and that from Mr. Whitaker they came to his son-in-law, Richard Taunton, Esq., M.D.; mutilated, however, from want of care and attention on the part of the individual who had held them as a deposit.

years since, the entire MS. of Drew and Hitchins's History of Cornwall was offered to him for eight or ten pounds. This too would be an important part of any general collection of County Manuscripts.—He might further mention that he had a couple of curious Diaries, in 1671 and 1675, written by John Allen, a Plymouth merchant; they contained records of very interesting circumstances, of both general and local importance; and copious extracts had been taken from them by Mr. Worth, for the Second Edition of his history of Plymouth. Mr. COLLINS added that his attention had been first directed to the subject by a letter written by his great-grandfather, Mr. George Browne, of Bodmin and Trewardale, in which the Manuscripts he had spoken of, and several others, were mentioned.

Dr. JAGO, after remarking that he was a descendant of the Tonkin Family, and that at the present time his brother held property which had been possessed by the historian, stated that an important MS. by Tonkin—a kind of day-book, from which, it would seem, he compiled portions of his history—was now in the possession of Mr. Freeth of Duporth.

Mr. REGINALD ROGERS believed that there were now Tonkin Manuscripts at Tehidy.* His great-uncle—Lord de Dunstanville—used them in the preparation of his "Carew." He had seen them at Tehidy within thirty years.

Mr. COLLINS said there was a MS. concerning the Killigrew Family, with Mr. Walker of St. Winnow; and Mr. WORTH spoke of the MS. history, by Martin Killigrew, of which he published an abstract in the *Journal* of this Institution.†

Dr. BARHAM said the Institution would be glad to receive the Manuscripts promised by Mr. Collins; and he hoped the presentation would be accepted by other gentlemen as a precedent; so that the Institution Library might serve as a kind of Record Office, where important historical documents might be consulted. It had been suggested that copies of the various public documents issued in the County might be preserved by the Institution, with a view to public utility. Again, the notion had been broached that it was very desirable to form a Collection of Autographs of persons of note in the county, and with these to associate their portraits and some illustrative views. Possibly a good beginning

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* Davies Gilbert states that Mr. Tonkin's papers were preserved by his niece, Miss Fosse; and that the MS. of the Parochial History, complete as Mr. Tonkin left it, got into the possession of Lord de Dunstanville, by whom it was instantly offered to him (Davies Gilbert) on his preparing to edit the Parochial History of Mr. Hals.

† See No. XII, p. 269.

might be made towards such Collections as had been suggested if members of the Institution were to present their own autographs and photographs.

Rev. C. M. E. COLLINS urged the necessity of caution against a reception of forgeries;* and asked whether it was intended to confine the Collection to gentlemen immediately connected with Cornwall; and Dr. BARHAM said he thought it would be unwise to refuse donations from beyond the limits of the county.

Mr. REGINALD ROGERS thought it was very desirable that, in addition to *Manuscripts*, this Institution should possess a complete collection of all works relating to the County; and Dr. JAGO suggested that where originals could not be procured, photograph copies might be had.

Dr. BARHAM said he had that morning received a letter from Mr. Copeland Borlase, stating that, owing to a severe attack of influenza, he was unable to leave his home; and adding that this was to him a cause of extreme regret, as he had looked forward with pleasure to being able to communicate the results of investigations, made by him in ancient Cornish villages and smelting-works, which restored, if he mistook not, a lost chapter to the history of Cornwall. He also stated that he had recently received half-a-dozen silver Roman coins found in the island of Samson, Scilly. They were of Constantius, Julian, and Honorius, dating from A.D. 351 to 395. These discoveries afforded evidence additional to that previously possessed, that the Romans at that time fully occupied this County, giving it the advantages of their civilization and their local government; while there existed with Rome a large trade in tin.

Rev. C. M. E. COLLINS mentioned that, a short time since, there was found near Cardynham, together with some pieces of flint and of pottery, what was supposed to be a mould for smelting tin; and he believed that Lord Vivian would willingly present it to this Institution.—Dr. BARHAM said a similar mould had been offered to the Institution by Mr. Rodd, of Trebartha.

Rev. H. S. SLIGHT inquired whether anything had been done of late with reference to the registration of Parish Registers; many of which contained historical notes of considerable importance. A few years since, clergymen received notice that they would be required to give up their charge of these Registers, as if something important was about to be done with them.—The PRESIDENT was unable to give any information on the subject.

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* Possibly a safeguard, combined with a heraldic advantage, might be attained if every donor of Autograph or Photograph were to attach his seal of arms or crest, or both.

At the conclusion of proceedings, Dr. BARHAM proposed that the best thanks of the Institution be given to Sir John St. Aubyn for the ability with which he had presided over the proceedings, and also for the manner in which he had discharged his duties as President during his term of office, notwithstanding the difficulties consequent on his occupation with more important public duties. It had been a great satisfaction to the Society to be able to associate with itself so distinguished a member of so distinguished a family.—Dr. LE NEVE FOSTER seconded the motion; and it was agreed to unanimously.—Sir JOHN ST. AUBYN suitably acknowledged the compliment; and vacated the chair in favour of the newly-elected President, Dr. JAGO, who returned his sincere thanks for the honour conferred upon him. He felt the responsibility of the office to which he had been elected, and promised his best endeavours to fill it worthily.

The evening conversazione was numerously attended, especially by ladies. Dr. Jago, F.R.S., the President, occupied the chair.

Mr. T. CORNISH, of Penzance, read a paper, in which, without giving in his adhesion to the theories of Ferguson and Marcus Keene, he applied them to the ancient rude stone memorials in West Cornwall. Ferguson, as is well known, holds that the cromlechs, stone circles, and similar antiquities, are of very much more modern origin than is commonly believed,—that they were erected by a people whom, by those relics of their presence, he traces from the East,—and that they are battle-memorials. Taking this as a starting-point, Mr. Cornish argued that at the time these memorials were erected, there could not have been a sufficient population in West Cornwall to take sides and engage in internecine warfare, and then to erect these important remains, which must have been the result of large associated effort. Moreover, these memorials must not only have been erected by a people who asssembled in numbers, but by persons who could work stone and were acquainted with the working of metals. Doubtful that this could be affirmed of the native Cornish at that date, he adduced the theories of Mr. Marcus Keene, and suggested that the cromlech builders came from Ireland, where such a people undoubtedly lived; and that track-lines of cromlechs, circles, and barrows, which he traced from Whitsand Bay near the Land's End, Hayle, and Padstow, might indicate the onward march of invaders landing at these spots respectively. He thought also that it was unlikely that the knowledge of raising and working of tin originated in the county. Most probably the knowledge was communicated

by foreigners; and there was, in the *Journal* of this Institution, an article by Mr. Kinahan shewing the close relation of Cornish mining-terms to the Irish language.*

The discussion which followed dealt incidentally only with Mr. Ferguson and his views.—Dr. BARHAM repudiated the idea that tin-mining was of so modern a date in its origin as the suggestions of these authors would imply; and quoted the testimony of Diodorus Siculus, and others.—Dr. LE NEVE FOSTER did not see why the natives might not themselves have found out the nature of tin; and he thought that Mr. Kinahan's coincidences might be explained by the fact that Erse and Cornish were cognate branches of the Celtic language.—Mr. WORTH agreed with Mr. Cornish, as to the sparseness of the population; but held that there was geological evidence to carry back the origin of tin-mining thousands of years before Diodorus.—Mr. J. H. COLLINS cited some of Mr. Kinahan's suggested explanations, to shew that they were untenable.

In the absence, through illness, of Mr. W. Copeland Borlase, who had promised information concerning some ancient Cornish villages and smelting-works which he had investigated, Mr. WHITLEY gave a lucid and interesting description of the nature and laws of storms, especially in their bearing on the West of England; his remarks being illustrated by means of several well-executed diagrams.

Dr. BARHAM spoke on the important subject of Surface Temperature; which is being investigated by himself and Mr. Whitley. The inquiry is likely to lead to practical results, in the securing early crops of vegetables from much of the danger to which they are now exposed from frost. It has already been proved that a very light and cheap shelter will afford a large amount of protection by preventing radiation.

Rev. C. M. EDWARD COLLINS then addressed the company at much length on the subject of local historical manuscripts. He exhibited those of Hals and Tonkin, traced their chequered history, and read from them and others some quaint and interesting extracts.

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* See *Journal of the Royal Institution of Cornwall*, No. xiv. *Notes on the similarity of some of the Cornish rock-names and miners' terms, to Irish words.*—By G. HENRY KINAHAN, M.R.I.A., &c.

Dr. Robert Tweedy in account with the Royal Institution of Cornwall. Cr.

1873.		£	s.	d.
July 31.	To Balance from last Account	77	12	2
	Annual Subscriptions	105	10	0
	Ditto H.R.H. the Prince of Wales	20	0	0
	Ditto Truro Town Council	20	0	0
	Visitors' Fees	2	18	0
	Sale of Journals	14	13	4
	Sale of Reports	1	4	2
	Illustration Fund	5	5	0
		£247	2	8
1873.	Balance	£24	15	3

ROBERT TWEEDY, Treasurer.

1873.		£	s.	d.
July 31.	By Taxes and Fire Insurance	6	5	8
	Repairs	7	5	2
	Curator's Salary.....	44	0	0
	Museum and House Expenses....	12	15	2
	Printing and Stationery	8	4	1
	Postages and Carriage of Parcels .	6	12	2
	Printing Journal last year	58	19	6
	Printing and Editing Journal and Report this year	46	1	9
	Illustrations for Journal	5	0	0
	Sundries	0	11	5
	Ray Society.....	1	1	0
	Palæontographical Society	1	1	0
	British Meteorological Society ..	1	0	0
	Royal Horticultural Society	2	2	0
	Quarterly Journal of Science	0	10	0
	Journal Geological Society	1	4	0
	Interest on Mortgage Debt	2	17	8
	Binding Books	0	15	11
	Mr. Vingoe for Cleaning and Restoring Birds, &c., in Museum	15	0	0
	Expenses of Conversazione.....	1	0	11
	Balance	24	15	3
		£247	2	8

☞ Mr. F. V. Budge, who is referred to in the Report as a Secretary, has recently ceased to reside in Cornwall; and consequently, at a meeting of the Council held on April 13th, 1874, two new Secretaries were appointed: Dr. Le Neve Foster and Mr. J. H. Collins. The present Secretaries, therefore, are:

Mr. Whitley, F.M.S., Penarth, Truro.
Dr. Le Neve Foster, F.G.S., Truro.
Mr. J. H. Collins, F.G.S., Truro.

JOURNAL

OF THE

ROYAL INSTITUTION OF CORNWALL.

No. XV. APRIL. 1874.

I.—*The Tin Trade of Cornwall in the reigns of Elizabeth and James, compared with that of Edward I.*—*By* Sir John Maclean, F.S.A., *Honorary Member of the Royal Institution of Cornwall.*

Read at the Spring Meeting, May 16, 1873.

THREE years ago, the *Royal Institution of Cornwall* did me the honour to receive a Paper containing some remarks on a Stannary Roll of 34th Edward I., and on some other similar Rolls, preserved in the Public Record Office. Those Rolls shed considerable light on the production of Tin in the County of Cornwall in the early part of the 14th Century.

I have recently found, among the Miscellaneous Books of the Augmentation Office,* two paper books of accounts which contain statements of the quantity of Tin coined at the four authorized Coinage Towns in the County during the greater part of the reign of Queen Elizabeth and in the early part of that of James I. Except that the names of the parties to whom the tin belonged are not given, as in the early Roll printed in the Journal of the Institution for 1871, these accounts contain much the same information. The number of the "pieces," or blocks, of tin at each

* Vols. 355 and 356.

weighing are shewn, and the aggregate weight, together with the amount of toll charged thereon. These Volumes contain the accounts for Devon as well as Cornwall; and the Table of Tolls set out on the first leaf of the second Volume shews the great disparity in the rates levied in the respective counties. The following is the Table for Cornwall :—

The rate yearly answered for Coinage of Tin in Cornwall	C^{ma} libras	iiij^{s}
	$\overset{xx}{\text{iiij}}$ xviij libras	iiij^{s}
	under $\overset{xx}{\text{iiij}}$ xviij libras to l libras	ob. de libr
	xlviij libras ..... :	ij^{s}
	under xlviij libras	ob. de libr

Whilst the toll in Cornwall was 40$^{s.}$ per 1000lbs., in Devon it was 15$^{s.}$ 7½$^{d.}$ only for the same weight.

The first of the two volumes commences in the 15th year of Elizabeth, and ends in the 29th year of that sovereign; but the statements for the first four years are imperfect. I have therefore abstracted the accounts for the 19th Eliz., or 1577, as the first year, and have made similar abstracts at intervals of 10 years during the period to 1607. The accounts extend to 1611, but in the subsequent years there is very little variation in quantity from the year 1607. In 1611 the yield was 1,012,500lbs.

I annex a Table shewing the quantity of tin weighed at the four authorized Coinage Towns in 34 Edw. I (1305) and at the several decennial periods embraced in the later accounts. Whilst the tin-producing districts had greatly changed (as we shall notice presently), the general yield remained much the same, the average annual production for the later period being 942,678lbs., as compared with 865,562lbs.* raised in 1305. Considering the great difference in the value of money at the two periods, it is obvious that the revenue derived by Elizabeth from the Stannaries of Cornwall was far inferior to that of her distant ancestor.

The two Coinage Towns in the East of Cornwall in 1305 were Lostwithiel and Bodmin. The tin weighed in that year in those

* It may be here noticed that the additions in the original Roll are in several places very incorrect.

two towns, and which, we conceive, represents the quantity raised in the Stannaries of Blackmore and Fowey moor,* was 616,686lbs., as compared with 248,876lbs., (including the weighings at a place which we could only read at Toynu, but which we presume means Truro) weighed at Truro and Helston. It is remarkable that at the latter place there were only two weighings in this year, amounting in the aggregate to 13,644lbs., only. The geographical area of production had considerably altered between the reigns of Edward I. and Elizabeth. This probably arose from the alluvial deposits having become, to a great extent, exhausted by streaming, and from the introduction of mining in the western part of the county. The average annual production of the two Eastern Stannaries, as represented by the coinage at Lostwithiel and Liskeard, which latter place had been substituted for Bodmin in the reign of Elizabeth, during the period of 40 or 50 years embraced in the later accounts, was 135,837lbs. only, as compared with 807,299lbs., the production of the two Western Stannaries of Tywarnhaile and Penwith and Kerrier. Moreover, upon a reference to the Table, it will be observed that this disparity was largely increasing every year, by rapid decrease in the eastern district, as well as increase in the western.

The Coinage usually took place twice in the year, viz., in June or July, and in September or October; and it may be noticed that the "pieces" or blocks of tin had greatly increased in weight from Edw. I. to Elizabeth, and were becoming larger every year. In 1305 the average weight of the pieces was 126lbs.; in 1577, 308lbs.; in 1587, 324lbs.; in 1597, 335lbs.; and in 1607, 346lbs.

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* The local limits of each of the four Stannaries have never, as it seems, been defined. They probably grew out of a general grant of jurisdiction, such as we find to have been usual in other royal mines. * * * * The name of each Stannary points out its original nucleus. Five tracts of stanniferous wastrel, with their adjacent vallies, supplied the ancient stream-works of Cornwall. The moor between Launceston and Bodmin, in which the Fowey river has its source, gave rise to the northern Stannary of Foweymore. Hensborough Beacon, with the tin grounds of Roche, Luxulyan, and St. Austell, formed that of Blackmore. A smaller district on the north coast, including St. Agnes and Cligga, and extending inland to Truro, constituted the Stannary of Tywarnhaile. The Stannary, or united Stannaries, of Penwith and Kerrier, included two great tracts of waste, of which one lies north of Helston in Kerrier, the other between Lelant and the Land's End. *Smirke. Vice v. Thomas, Appendix*, p. 96.

Table shewing the quantity of Tin coined in various years between 1305 *and* 1607.

Coinage Towns.	Tin weighed in Pounds.				
	1305.	1577.	1587.	1597.	1607.
Bodmin.....	166,329	——	——	——	——
Lostwithiel	450,357	128,688	68,546	74,768	69,290
Liskeard	——	79,160	59,938	25,948	35,010
Helston.....	13,644	356,464	496,487	424,986	454,372
Truro	153,843	384,794	287,986	397,785	426,492
Toynu	81,389	——	——	——	——

I shall content myself with bringing these facts under the notice of the Members of the Royal Institution, among whom are many gentlemen more acquainted with the specialities of the subject, and better qualified than I am to draw deductions therefrom which may be interesting and possibly useful.

II.—*On the Detrital Tin-Ore of Cornwall.*—*By* WILLIAM JORY HENWOOD, F.R.S., F.G.S., *Sometime Her Majesty's Assay-Master of Tin in the Duchy of Cornwall, Member of the Institution.*

Read at the Spring Meeting, 16th May, 1873.

AS the detrital deposits of tin-ore in Cornwall and Devon have been wrought from remote antiquity, they are nearly—though not yet quite—exhausted. The most important* have often, and other of them† have sometimes, been described; on some few,

* The rich and extensive deposit at Carnon has been described by Maton, *Observations on the Western Counties*, ii, p. 173. Rashleigh, *British Minerals*, i, p. 5. Berger, *Geol: Trans:* i, p. 162. De Luc, *Geological Travels*, iii, p. 325. Smith, *Ibid*, iv, p. 409. Hitchins and Drew, *History of Cornwall*, ii, p. 264. Sedgwick, *Annals of Philosophy*, ix, p. 249. Dufrénoy, De Beaumont, Coste, et Perdonnet, *Voyage Métallurgique en Angleterre*, ii, p. 261. Henwood, *Cornwall Geol*: *Trans*: iv, p. 57, v, p. 91.* The large and productive formation at Pentuan has been illustrated by Bonnard, *Journal des Mines*, xiv, p. 450. De Luc, *Geological Travels*, iii, p. 338. Smith, *Geol*: *Trans*: iv, p. 404. Hitchins and Drew, *History of Cornwall*, ii, p. 62. Héron de Villefosse, *Richesse Minérale*, ii, p. 354, *Pl.* xxi, *Fig.* 7. Sedgwick, *Annals of Philosophy*, ix, p. 247. Dufrénoy, De Beaumont, Coste, et Perdonnet, *Voyage Métallurgique en Angleterre*, ii, p. 258. Colenso, *Cornwall Geol: Trans*: iv, p. 29, *Pl.* i. Winn, *Reports of the Royal Institution of Cornwall*, xxi, (1839), p. 45; xxii, (1840), p. 38. Combe's, *L'Exploitation des Mines*, i, p. 352, *Pl.* xiii, *Fig.* 3. Stocker, *Transactions of the Penzance Natural History Society*, ii, p. 88. Von Cotta, *Ore-Deposits*, p. 421. Flower, *Annals and Magazine of Natural History*, 4th Series, ix, p. 440.

† Smaller accumulations of similar character, worked at Dowran, Pillianeth, Pemedar, Leswhidden, Bostraze, Drift, Numphra, Kerris, Chyvenhall, Clija, and Marazion-marsh, in the western—at Porthleaven, Loepool, Porkellis, Portreath, Porth Towan, and Perran-porth, in the central;—at Tregony, Pensagillis, Hallibesack, Frog-moor, Swan-pool (Ladock), Treloy, Goss-moor, Gaverigan, Poth (Porth), Par, Sandrycock, Tregurthy-moor, Merry-meeting, Mullinis, Grove, Levrean, Water-gate, Pendelow, Broadwater, and Bodgara-moors, in the eastern part of Cornwall; and at Lydford, Walkhampton, Sheepstor, Manadon, Chagford, Kingsteignton, and Teigngrace, in Devonshire; have been described—by Borlase, *Natural History*, (second edition), p. 162. Pryce, *Mineralogia Cornubiensis*, p. 68. Jars,

operations are still in progress, and to these, most of the following notices relate.

Between the Land's-End and Saint Ives the granite and the slate, in contact with it on the north and north-east, are traversed by metalliferous-veins *(lodes)*; but their numbers, directions,* and mineral characters differ in various parts of the district. Towards the south they are poorer and less numerous than in any other portion of the neighbourhood; yet one of the few mines† wrought here has yielded some amount of *wood*-tin-ore. The central region is more productive; and, in one spot, at least, tin-ore not only forms numberless thin veins, but is so generally disseminated, that—so to speak—it is an ingredient of the rock.‡ Near the northern and north-eastern boundaries of the several series, however, many rich *lodes* have been, and—indeed—still are, largely and profitably worked. In some instances also *off-shoots* (if they may be so designated) of great, but of yet unascertained, length,

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Voyages Métallurgiques, iii, p. 188. Klaproth, *Mineralogical Observations*, p. 12. Maton, *Observations on the Western Counties*, i, p. 152. Rashleigh, *British Minerals*, i, p. 5; ii, p. 24, *Pl.* xxi. *Cornwall Geol*: *Trans*: ii, p. 281. Berger, *Geol*: *Trans*: i, pp. 153, 161. De Luc, *Geological Travels*, iii, pp. 155, 211. Smith, *Geol*: *Trans*: iv, p. 409. Hawkins, (Sir C.), *Cornwall Geol: Trans*: i, p. 235. Majendie, *Ibid*, p. 237. Sedgwick, *Annals of Philosophy*, ix, p. 249. Hawkins, (John), *Cornwall Geol: Trans*: ii, p. 235. Paris, *Guide to the Mount's-Bay*, p. 197. Michell, *Manual of Mineralogy*, p. 72. Carne, *Cornwall Geol*: *Trans*: ii, pp. 293, 331; iv, (1830), pp. 47, 95, vi, p. 233. Boase, *Ibid*, iii, p. 31. Thomas, (R.), *History of Falmouth*, p. 31. Henwood, *Cornwall Geol*: *Trans*: iv, (1828-9), p. 60; v, pp. 14, 34, 42, 55, 68, 90,* 110, 129, 141; viii, p. 695; *Address to the Royal Institution of Cornwall Journal*, No. xi, p. x. De la Beche, *Report on the Geology of Cornwall, Devon, and West Somerset*, p. 401. Barratt, *Ibid*, p. 403. Allen, *History of Liskeard*, pp. 4, 27, 204. Rogers, (J. Jope), *Cornwall Geol*: *Trans*: vii, p. 352. Polwhele, *Historical Views of Devonshire*, i, p. 110. *History of Devonshire*, i, p. 158. Lysons, *Devonshire*, i, p. cclxx. Rowe, *Perambulation of Dartmoor*, p. 68, 255, 312. Von Cotta, *Ore-Deposits*, p. 421.

* Carne, *Cornwall Geol: Trans*: ii, p. 321. Henwood, *Ibid*, v, pp. 9. 250; *Table*, ciii; viii, p. 674; *Journal of the Royal Institution of Cornwall*, No. xiii, (1871), p. xvi. Moissenet, *Annales des Mines*, 6me Série, iii, p. 161.

† Klaproth, *Mineralogical Observations*, p. 21. Carne, *Cornwall Geol: Trans*: iv, p, 95. Henwood, *Ibid*, v, p. 32.

‡ Henwood, *Cornwall Geol*: *Trans*: v, p. 235; viii, p. 664; *Journal of the Royal Institution of Cornwall*, No. xiii, p. xiii.

of irregular width, and of small, yet unequal vertical range *(Carbonas)** spring from the *lodes;* and in one locality unconnected metalliferous masses of enormous dimensions are imbedded in the granite.† Throughout the whole tract tin-ore has been the principal product,‡ but here and there copper-ore has, from time to time, abounded; and several mines have afforded other metallic minerals,§ but in much smaller quantities.

From *Balleswidden,* in the south-east of Saint Just—where the rock is, more or less, sprinkled with tin-ore*—the surface declines for some distance, towards the south-west; but, as the slope is greater in the middle than at the sides, these soon converge in a narrow glen, which from Kelynack trends north-westward to the beach at Pornanvon.‖ A deposit of detrital *(Stream)* tin-ore in the southern and central parts of this ravine¶ has long since been exhausted; but at Bosworlas, on the northern margin, a narrow strip of virgin *tin-ground* has afforded employment to successive generations of the same family during great part of the present century.

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* Henwood, *Cornwall Geol: Trans*: v, p. 21; vii, p. 179; *Pl.* i; *Journal of the Royal Institution of Cornwall*, No. xiii, p. xxvi. Haughton and Scott, *Mineral Agent's Handbook*, p. 39.

† Henwood, *Cornwall Geol*: *Trans*: v, p. 24.

‡ Within the boundaries of this district the undermentioned masses of Jew's-house-tin have been obtained;—

at Pillianeath, in St. Just....	weighing 5lbs.	Carne, *Cornwall Geol*: *Trans*:	ii, p. 293.
,, Bossuliack, in Madron....	,, —	Le Grice, *Ibid*,	vi, p. 44.
,, Trereife, ,, ...	,, 26lbs.	,, ,,	,, 45.
,, Tremethick, ,, ...	,, 38 ,,	Whitley, (H. M.), *Journal of the Royal Institution of Cornwall*, No. xiii, p. lxxxviii; Collins, *Ibid*, p. 83.	

§ Borlase, *Natural History*, p. 209. Carne, *Cornwall Geol: Trans*: ii, pp. 296-304; vi, p. 48. Boase, *Ibid*, ii, p. 384. Henwood, *Ibid*, v, pp. 12, 19; *Ibid*, viii, p. 444. Penberthy, *Ibid*, vi, p. 106.

‖ Borlase, *Natural History*, p. 76, *Pl.* xix, *Fig.* 4. Carne, *Cornwall Geol*: *Trans*: ii, p. 343; iii, p. 230. Henwood, *Ibid*, v, p. 13.

¶ The water used for washing *(Dressing)* purposes at *Balleswidden* flows down this gorge; and particles of ore which it carries off in suspension, are collected and subjected to further treatment here.

At the spot now wrought:—

(1). Vegetable mould extends from the surface....to a depth of 2 or 3 feet; which, in some parts of the glen, is succeeded by:—

(2). Granitic gravel and shingle,* sparingly mixed with subangular masses of granite and its congeners containing thin strings of various vein-stones, sometimes sprinkled with tin-ore;..... ,, ,, a few inches; this, however, is scarcely distinguishable from—

(3). The *tin-ground*, which also consists of granitic matter, subangular and rounded fragments of tin-bearing vein-stones, and pure tin-stone either more or less rounded or in angular fragments .... ,, 3 inches to 2½ feet.

The surface of the tin-ground maintains, throughout the ravine, a tolerably uniform slope seaward; the rather considerable differences in its thickness being consequent on irregularities of contour in the granite *(shelf)* beneath. This varies little in composition, but much in hardness, within short distances; moreover in the softest portions the depressions (erosions?) are deepest and most numerous, and—at the same time—the bed of tin-ore is thickest and best.†

Large blocks of coarse-grained granite‡ occur at intervals;

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* Pebbles of slate are mixed with gravel, shingle and boulders of granite in the cliff at and near Pornanvon. Borlase, *Natural History*, p. 76. Carne, *Cornwall Geol*: *Trans*: iii, p. 230. Henwood, *Ibid*, v, p. 13.

† At Merry-meeting near Roche the stream-tin-ore is richest and most abundant where the granite beneath it is softest. Henwood, *Ibid*, iv, p. 61.

‡ As the coarse texture, and open-jointed prismatic structure of the granite offer most favourable conditions to disintegrating atmospheric influences, it is scarcely surprizing that this district contains no fewer than eleven *logan-rocks;* viz., in:—

Saint Levan, three.

1 At Castle Treryn ..... The Logan-rock..... Mentioned in every Itinerary of the district;—
1 ,, near the base of the Cairn, a smaller one.. Undescribed:—
1 At Bosistow-cliff ..... Described and figured, (Blight, *Land's-End*, p. 120);—

Towednack, one.

1 On Rosewall hill, ... Mentioned, (Henwood, *Cornwall Geol*: *Trans*: v, p. 18);—

but here and there they are so closely grouped as to afford mutual support. Some of them rest on the vegetable mould, others touch the gravel and shingle; usually, however, they reach—and a few intrude on—the *tin-ground*,* but in no instance have they passed, quite throughout it, to the granite beneath.

Near Bejowans in Sancred the bed of a confluent with the little vale which extends from Tregonebris to the coast at Lamorna, presents the following section :—

(1). Granitic sand and gravel, mixed with small angular and subangular masses of granite ..... 6 to 12 feet;
(2). Peat; in which nuts and branches and roots of hazel are imbedded here and there ..... 2 ,, 8 ,,
(3). Granitic sand, gravel, and pebbles, sparingly interspersed with large boulders of granite ..... a few inches; this—except that it is generally unproductive—differs but little from—

Zennor, seven.

1 Near the summit of Carn Galver ..... Discovered and sketched by Mr. Joseph Blight.
1 N. of the Church ..... Described (Blight, *Land's-End*, p. 220.
1 Near Tregarthen-cottage (*The Eagle's-nest*) .... Undescribed.
1 ,, ,, ,, ,, ,, S.W. .... Undescribed. Discovered by Captain Pooley, of *Trelyon*.
3 Half a mile S. of Tregarthen-cottage and a furlong E. of Zennor Cromlech ..... } Photographed by Ashton of Saint Ives .....

To a casual observer the three small *logan-rocks* on Tregarthen-hill differ but little from the other groups of granite scattered over the moist, furze-clad, surface; but on inspection a flattish rock, of small extent, is found to support—at two or three feet above the general level,—two contiguous rocks, of like mineral character, and on one of the two rests a third, of the same kind. All may be easily moved; and whenever one of them is set in motion both the others move with it, though to a smaller extent; but by application of a different force to each it may take a peculiar movement of its own.

In 1769 *logan-rocks* existed at Bosworlas in Saint Just and at Karn-lehau in Towednack, (Borlase, *Antiquities of Cornwall*, Second edition, p. 180, *Pl.* xi, *Fig.* 3); but in 1842 the former had ceased to be moveable, (Buller, *Statistical Account of Saint Just*, p. 87, and of the latter no intelligence is now to be obtained.

* Enormously large masses of quartz rest on the *tin-ground* at *Merry-meeting*. Henwood, *Cornwall Geol*: *Trans*: iv, p. 61.

(4). The *tin-ground*, which consists generally of rounded masses of felspathic granite and of tin-ore; the latter being, in great measure, *(wood-tin)* of divergingly-fibrous structure; with ore of this kind both the pyramids and the prisms of crystals of quartz, are now and then invested.* Fragments of different vein-stones, and not unfrequently crystals of quartz, are imbedded in the other ingredients ..... 2 to 9 feet.

The granite *(shelf)* beneath abounds in felspar but contains little quartz or mica. Within short distances, however, it varies in hardness, and everywhere its surface is uneven; in the softest parts the depressions are deepest, and here the ore is both richest and most plentiful.

Between Towednack-church and Amellibrea operations in the lower part of Cold-harbour-moor disclose:—

(1). Peat ..... for a depth of 2½ feet;
(2). Disintegrated, subangular, granitic matter, (gravel); unequally mixed with blue clay to different depths in various parts of the vale; but generally unproductive ..... ,, ,, 3 ,,

Beneath the clay a brownish-buff hue prevails, and small quantities of tin-ore are scattered through the gravel; but lower and more productive portions of the deposit assume a reddish brown tint; and, in these, angular and, more or less, rounded masses of tin-bearing vein-stones are numerous ..... ,, ,, 6½ ,,

The granite *(shelf)* underneath presents an undulating surface of unequal hardness; from the deeper depressions in the softer parts of which moderate quantities of detrital tin-ore have been obtained.

At Tregilsoe,† on the confines of Ludgvan and Saint Hilary, a section of the short and shallow vale which terminates in Marazion-marsh, presents—

(1). Peat;—of which the surface—maintaining a tolerable parallelism to that of the *tin-ground*—declines irregularly, but the thickness is, pretty uniformly, about ..... 6 feet;

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* Klaproth, *Mineralogical Observations on Cornwall*, p. 20. Rashleigh, *British Minerals*, i, p. 48, *Pt.* xxxii, *Fig.* 4. Carne, *Cornwall Geol: Trans:* iv, p. 100.

"A remarkable mamillated variety [of *wood-tin*] has occurred very lately, *in sitû*, at Sancreed, it is in the form of thick concretions capping crystals of quartz."

Greg and Lettsom, *Manual of Mineralogy*, (1858), p. 358.

† Named Tregilliow in the *Ordnance Geological Map of Cornwall*, Sheet xxxiii.

(2). The *tin-ground*, throughout its entire width, is divided—obliquely both to its surface and to the *(shelf)* rock it rests on—by a thin seam of clay impervious to water; and on opposite sides of this it is of remarkably different appearance.

The upper part consists of angular and subangular masses of slate, of quartz, and of various *(Shodes)* vein-stones, and of smaller bodies and granules of crystalline tin-ore bearing traces of fracture or of abrasion, all imbedded in bluish clay.

In the lower portion pebbles of slate still prevail, and nodules of felspathic porphyry *(Elvan)* are not uncommon; but quartz occurs less frequently and in smaller masses; the tin-ore rarely appears unmixed, but—contrariwise—is diffused through matrices natural to it in the slate-series. The interstices are filled with tough clay of reddish-brown hue. The deepest are not always the richest parts of the deposit..... 9 feet.

The works are within a mile and a half S.E. of the granite, yet they afford no trace of granitic matter.

The tender and fissile *(Shelf)* slate beneath—often little other than laminated-clay—rapidly softens on exposure; and the perceptible disintegration and consequent increase of volume, give—so to speak—a yeasty appearance to the semi-fluid mud.

Small quantities of *Stream-tin-ore* have been obtained also at Penrose in Sennen, Tregadgwith in Saint Burian, and in some other glens which open to the sea between the Land's-end and Penzance; but—even at the high prices which have lately prevailed—the proceeds have not sufficed to pay the workmen. Near the confluence of the streams from Cold-harbour-moor* and Tregilsoe,† at the head of Marazion marsh,‡ an inconsiderable deposit of this

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* *Ante*, p. 196.

† *Ibid*, p. 196.

‡ "The open sea (as I have seen in the Mount's Bay) throws in [tin-ore] to us in a pulverized state." [This] "comes probably from some lodes, "which, lying bare to the sea, have their upper parts fretted off, and by "storms thrown in among the sands." Borlase, *Natural History*, p. 164.

"The sand of the eastern or Marazion *green* affords tin-ore sufficient "to pay in some measure for its *streaming*, which process on a small scale "is here in actual operation."

Boase, *Cornwall Geol: Trans:* iii, p. 178.

"A bed of *stream tin-ore* of very inferior produce, some 20 or 30 feet "above the sea-level near Newtown, on Marazion green, has for many years "afforded employment to a few persons; and in the vale between *Wheal* "*Darlington* and the *Marazion Mines* a thin and poor bed of *tin-ground* rests "on the *shelf* at about the sea-level; on this reposes a bed of vegetable "matter containing the trunks and branches of oak, willow, hazel, and per-"haps other trees, as well as nuts in abundance; this is again covered, to "the level of the slimy soil which bears the present vegetation, by sea-sand "mixed with shells." Henwood, *Ibid*, v, p. 34.

Carne, *Ibid* vi, p, 233.

kind, was wrought,—by aid of a small high-pressure pumping-engine—for several years.

The comparatively small body of granite* extending from Godolphin-hill to the sea,—the slate† bounding it landward,—and the *elvans*‡ traversing both granite and slate—are all intersected by numerous *lodes* which take an average direction of about 16° N. of E.—S. of W.§ Of these a few have afforded the ores of copper; but all other have been, and still are rich in tin-ore, of which, indeed, this district is one of the most productive in Cornwall.||

The southern part of the tract is drained by the short deep glen which reaches the coast at Porthleaven; but it bears slight traces of ancient *tin-streaming*.

The streams which rise on the north-western, northern, and north-eastern slopes of Godolphin, unite with rivulets from Clowance and Skewes in Crowan; and, together, they find their way to the north coast at Hayle. At Saint Erth the

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Some forty years ago the reedy tarn which forms part of Marazion marsh abounded with water-lilies; but when operations were resumed at *Wheal Darlington* (the *Bog* mine), the entire tract was drained, and the peat it contained supplied the neighbourhood with fuel. As soon as the works were abandoned, however, the ground was again overflowed; the rootlets which had escaped the ravages of the cottagers again put forth shoots, and—after an interval of, perhaps, thirty years—leaves and flowers have lately re-appeared.

* Borlase, *Natural History*, p. 99. Sedgwick, *Trans: Cambridge Phil: Society*, i, p. 111. Boase, *Cornwall Geol: Trans:* iv, p. 354. Henwood, *Ibid*, v, p. 43. De la Beche, *Report on the Geology of Cornwall*, &c., p. 162. Haughton, *Proceedings of the Royal Society*, xvii, pp. 209-11.

† Hawkins, *Cornwall Geol: Trans:* ii, p. 380. Sedgwick, *Trans: Cambridge Phil: Society*, i, p. 117. Thomas, (R.) *Mining Review*, No. ix, p. 30. Boase, *Cornwall Geol: Trans*: iv, pp. 348, 350. De la Beche, *Report*, p. 100. Henwood, *Cornwall Geol: Trans*: v, p. 47.

‡ Carne, *Cornwall Geol: Trans*: i, p. 102; ii, p. 83. Sedgwick, *Trans: Camb: Phil: Society*, i, p. 129. Boase, *Cornwall Geol: Trans*: iv, p. 354; *Primary Geology*, p. 57, *Fig.* 3. De la Beche, *Report*, p. 175. Henwood, *Cornwall Geol: Trans*: v, p. 51.

§ *Ibid*, v, p. 250; viii, p. 674; *Journal of the Royal Institution of Cornwall*, No. xiii, p. xvi.

|| Carew, *Survey of Cornwall*, p. 153. Hitchins and Drew, *History of Cornwall*, ii, p. 116. Henwood, *Cornwall Geol: Trans*: v, p. 53; viii, p. 446. Blight, *Churches of West Cornwall*, p. 72. *Parochial History of Cornwall*, i, p. 140.

bed of this rivulet* presents the undermentioned section;†—

(1). Gravel, sand, and mud;—

(2). Peat;—

(3). Roots, trunks, and branches of trees; mixed with quantities of nuts;—and

(4). The *tin-ground*, which—although neither rich nor extensive—was wrought, near Saint Erth bridge by the use of much such a steam-engine as that worked at Marazion-march.‡

The easternmost of the two great granitic tracts in West Cornwall extends from Prospidnick and Nancegollan on the west to Ponsnooth and Budock on the east, and from near Polwheverell on the south to *Wheal Buller* on the north; and—though separated at the surface by shallow scales of slate§—the range of Carn Brea and Carn Entral as well as the hill of Carn Marth are probably connected with it at inconsiderable depths. Both granite and slate are penetrated by broad dykes of felspar-porphyry *(Elvan-courses)* which in, rare instances, contain tin-ore.|| All these rocks are traversed by metalliferous veins *(lodes)*, which maintain an average direction of about 20° N. of E.—S. of W.,¶ but, in the very same mines, other *(Caunter) lodes* bear nearly N.E.—S.W.** On and about the southern boundary of the granite tin-ore is their sole produce;—towards the east, however, tin-ore prevails only near the surface, whilst the ores of copper occur beneath;—and along the northern margin copper-ores abound at intermediate depths, but tin-ore is plentiful both above and below†† them.

Numberless rills, rising far within the granitic region, unite to

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* The gravel, sand, and slime escaping during treatment of ores at the mines worked on various tributaries of this stream, have lately been collected, near the Saint Erth Rolling-mills, and rewashed to some advantage.

† Mr. W. J. Rawlings, of Downs, near Hayle, MSS.

"The largest lump of *Jew's-house-tin* or *Jew's-bowl* I have heard of "weighed 37lbs., * *; it formed part of a hedge in the Parish of Gwinear." Carne, *Cornwall Geol*: *Trans*: ii, p. 293.

‡ *Ante*, p. 198.

§ Thomas, (R.), *Mining Review*, No. viii, p. 265.

|| Henwood, *Cornwall Geol*: *Trans*: v, p. 37-8, 85.

¶ *Ibid*, v, p. 250; viii, p. 674.

** *Ibid*, v, p. 252.

†† *Ibid*, v, *Table* li. Thomas, (J.), *Journal of the Royal Institution of Cornwall*, iii, pp. 191-2.

form the river Cober, a principal feeder of the Loe-pool.* The swampy moorlands—portions of Carn-wartha, Mean Vroaz, Lezerea, Carth-vean, and perhaps of other, tenements—through which they find their way near Porkellis in Wendron have been wrought by Tin-streamers for many ages;† but, though their produce has greatly diminished, they are not yet quite exhausted; in many cases, however, the principal detrital deposits of tin-ore are found to have been already explored by earlier workman.

The upper part of Carn-wartha displays;—

(1). Angular and sub-angular masses of granite and of thin quartzose and schorlaceous veins mixed with lumps of peat and quantities of granite gravel and sand;—the refuse of previous operations..... 12 feet;—

(2). *Tin-ground.* Quartzose, felspathic and schorlaceous sand and gravel, unequally sprinkled with, more or less rounded, granules of tin-ore; interspersed, at intervals, with blocks of granite and schorl-rock, of much the same character as those in the overlying rubbish. This deposit,—now wrought for the first time—is ..... 12 feet thick;

The *Shelf*—of disintegrated granite—contains numerous small, isolated, bodies, and short, narrow, veins of quartz and schorl, irregularly impregnated with tin-ore.

In Mean Vroaz great quantities of detrital tin-ore were obtained by the *Streamers;* who—on reaching the granitic shelf—discovered the outcrop of *lodes* which were wrought, to some depth,‡ with considerable advantage.

At Lezerea the successive deposits are,—

(1). Peat; in the deeper part of which nuts and branches of hazel are sometimes found. The depth varies, but seldom exceeds ..... 4 feet;—

(2). Coarse granitic gravel containing, here and there, sub-angular *stones* of tin-ore ..... 2 to 3 feet;—

(3). Granitic sand slightly, and at intervals, mixed with felspathic clay ..... 2 ,, ;—

(4). *Tin-ground.* Angular and somewhat rounded masses of granite and schorl-rock, largely mixed with tin-ore of rather different character from that obtained at Carn-wartha ..... 3 ,, ;—

The Shelf—of disintegrated, felspathic, granite—maintains a tolerably uniform composition to considerable depths; but in structure the shallower portions, which afford traces of detrital tin-ore, differ materially from the deeper, which are traversed by numerous small *strings* of tinny quartz-rock.

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* Rogers, (J. Jope), *Cornwall Geol*: *Trans*: vii, p. 352.

† Boase, *Ibid*, iv, p. 332. De la Beche, *Report*, p. 401.

‡ Mr. Frederick Hill, F.G.S., of Penhellis near Helston, MS.

In other parts of the moor sections of ancient works show beds of detrital matter resting immediately on the outcrop of tin-bearing veins in the *(Shelf)* granite.

From Porkellis to Trenear, and thence downward to Helston, traces of *stream-works* are visible at short intervals. And from the bed of the Loe-pool tin-ore has been also obtained.*

Neither the stream—nor the mine-tin-ore presents trace of either copper—or iron-pyrites; and, throughout the neighbourhood, trout thrive in every rivulet and pool.† Generally speaking, the detrital tin-ore is less rounded in this, than in any other part, of Cornwall; and, mixed with it, water-worn granules of exceedingly pure gold‡ are sometimes, though but seldom, found.

Near Tregedna,§ in Mawnan, vegetable mould and hardened silt, to a thickness of twenty or thirty feet, overlie a very thin

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* Rogers, (J. Jope), *Cornwall Geol*: *Trans*: vii, p. 354.

† Fish of considerable size are frequently caught in the deep pits of abandoned works.

‡ Some five and thirty years ago, whilst examining a small *parcel* of *stream*-tin-ore brought from this district to one of the Smelting-houses at Hayle; I found, amongst it, a lump of gold, nearly, if not quite, as large as a pea.

§ "A mass of *Jew's-house-tin*, three or four pounds weight, was found amongst the remains of an ancient furnace, near the well at Tregedna." Mr. Joshua Fox, MS.

The public enjoy almost unlimited opportunity of observing that birds without number frequent the beautiful grounds of Tregedna; accompany Mr. Fox in his walks, alight on his person, and feed from his hand.

During my sojourn in Brazil an English resident at *Gongo Soco* presented one of my little household with a specimen of the *Merlo (? Merula minor)* a jet-black bird about the size of a starling; which had been taken from the nest, whilst yet unable to feed himself or to fly; thus early, however, he bathed after every meal. Showing no disposition to wander, he was never caged, but hopped and fluttered about the premises at will. It was impossible not to notice habits so unlike those of any other bird I had ever seen; and the interest I felt seemed to awaken some corresponding feeling in him, for he accompanied me through the garden and returned with me to the house. The little basket in which he had always slept, was now placed, at night, within reach of my bed. At dawn he awoke me by the rustling of his feathers, and if I did not leave the bed at sun-rise he hopped to the pillow and pulled my hair or tugged at my night-cap; whilst I dressed he sat on the sill of the open window and poured forth his sweet morning song.

When I left the house he betook himself to the garden, where he adroitly seized, and heartily fed on, grubs, insects, and worms, disturbed by the rake or unearthed by the shovel of the workman; great part of his time he sat and sang amongst the palms, bananas, and orange-trees; paying, however,

and exceedingly poor deposit of detrital tin-ore, and this rests on the *(Shelf)* slate of the country. The earthy matter examined and rejected by *tin-dressers* of an earlier period have been discovered

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occasional visits to the kitchen, where he helped himself to whatever he fancied. He bathed many times every day in a little pool which he had dug, for his own use, in the gravelly bed of a rill which wound through the grounds. Now and then he associated with other birds which frequented the place, but, —being somewhat pugnacious—I believe, he more commonly drove them away.

On my return to breakfast or dinner I called or whistled to him, and—if at hand—he immediately hopped on my stick when held out to him, or perched on my shoulder or my head; if further distant, however, he instantly replied, and I had scarcely seated myself before he would dart through an open window or between the branches of the flowering shrubs which shaded the veranda, and—almost brushing my face with his wings—alight on the table before me. He fed off the edge of my plate, on small bits of meat with crumbs of bread and of potatoes, but never hesitated to take anything else he desired. After he had finished his meal he placed himself (most inconveniently) between me and my plate, and was instantly asleep. His nap however was but a short one; and, on awaking, he either flitted about the room, occasionally catching flies, or walked about the table, sometimes throwing knives and forks on the floor, but, in preference, pulling the spoon out of the mustard, and—as if conscious of having done wrong—screeching as he fluttered out of reach. On my leaving the breakfast-table he usually played about me for a few minutes and then flew off to his bath in the garden. When ale was taken at dinner he watched the bubbles as they rose, and quickly peeped over the rim of the glass to see them as, in succession, they burst at the surface. But before the cloth was removed, and whilst the sun was still shining, he became drowsy and chattered for his basket, hopped into it as soon as it was brought, and was asleep in a moment.

* * * * * *

He was always the first to welcome me home from journeys which sometimes involved an absence of a day or two; and if—as was not uncommonly the case—urgent business compelled my instant attention, a tug at my hair or a pinch of the ear reminded me that I had not acknowledged his greeting. On one occasion, however, I did not return for nearly a week; and, to my surprize he was not present to receive me on my arrival. It appeared that for three or four days after my departure he had continued to take his meals, and to sleep in my bed-room, as usual; he then discontinued his visits to the house, yet had been seen two or three times in the garden; but afterwards all trace of him had been lost. Grieved—not unnaturally—at the disappearance of so interesting a favourite, I visited every walk we had usually taken together through the grounds, but without receiving a reply to the call which heretofore had brought him instantly to my side. At length I caught a faint note, which was repeated when I called again; this led me to an unfrequented part of the garden; when my poor little shrunken bird—his glossy plumage rumpled and soiled, his bright eye half-closed and dim—crept feebly from beneath a fallen banana-leaf; and, with every demonstration of pleasure, took his accustomed place on my walking-stick. On

in the neighbourhood, but whence the ore was obtained is now unknown.*

Between Higher Carnon and Restronguet-creek the largest known body of detrital tin-ore has been wrought—at intervals within my recollection—by five several parties of speculators in succession; by the first two as open-works;† but by the other three in shafts‡ sunk deeper than the bed of the inlet, and by drifts in which the miners worked whilst laden ships sailed over head.§

About the middle of the navigable channel near Point,—where

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returning to the house he resumed his station at the table, and again occupied his basket in my bedroom.

* * * * * *

My pretty, engaging, and affectionate companion died whilst moulting; and was buried beneath a flowering shrub, which he had loved to frequent.

* * * * * *

His grave was the last spot I visited in Brazil; and I still preserve the spray from which he carolled, and a feather of his wing.

* A mass of *Jew's-house-tin*—since placed in the Museum of the Royal Institution of Cornwall—was discovered, by Mr. Cuttance, at Trenower in Saint Martin, a south-eastern Parish in the (Lizard) Meneage district, some miles from any now-known habitat of tin ore, and far beyond the confines of this region. Dr. Jago, M.D.; F.R.S.; MS.; *Report of the Royal Institution of Cornwall*, xlv, (1863), p. 18.

† The last of the *open-works* afforded a profit of about.....£50,000.

‡ The first of the *Mining-works* afforded a profit of about ....£28,000.
The second ,, ,, eventuated in a loss of about ....£16,000.

Trebilcock, Michell, and Cloak, *Cornwall Geol*: *Trans*: viii, p. 452, *Table*, xiv.

§ The [open] stream-works "were found sufficiently profitable to induce "the adventurers to extend their operations down the navigation nearly a "mile and a half....[But] latterly the work has been carried on in another "way;....a shaft was sunk in the firm rock of the shore, and a drift was "extended from the bottom,....by which means the tin was obtained by "removing only a small part of the great mass of mud which covered it.... "These operations have been sufficiently successful, to induce the adventurers "to extend their works half a mile further down; two shafts having recently "been sunk through the mud in the middle of the creek, and secured by "lining them with iron cylinders. The lower shaft...is surrounded by an "artificial island formed of stones and rubbish, on which is erected a steam-"engine." Thomas, (R.), *History of Falmouth*, p. 31.

the bed of Restronguet-creek is some twelve feet below high-water at spring-tide—a shaft has lately been sunk through the undermentioned deposits,—*

(1). Mud of the river (very soft) ..... 6 feet;—
(2). Mud and coarse sand ..... 8 ,, ;
(3). Mud (hardened) ..... 6 ,, ;
(4). Mud, mixed with great quantities of Oyster-shells ..... 12 ,, ;
(5). Mud (hardened) ..... 31 ,, ;
(6). *Tin-ground* (6 inches to 6 feet) .....mean 4 ,, ;
The *Shelf;* homogeneous blue or buff-coloured clay-slate.

Another section, in the same neighbourhood, presents,—†

(1). Soft river-mud ..... 7 to 9 feet;—
(2). River-sand and mud..... 9 ,, ;
(3). Blue mud mixed with Oyster, Cockle, and other shells..... 9 ,, ;
(4). Stiff blue mud, without shells ..... 36 ,, ;
(5). *Tin-ground* (Subangular masses of granite, slate, *elvan*, quartz, quartzose slate-*capel*, and tin-ore in large masses, plentifully interspersed with smaller grains ..... 6 inches to 6 ,, ;
(6). The *Shelf;* clay-slate.

The tin-ground was no where else so rich as at the confluence of the Carnon valley with the vales which extend respectively through Perran-Wharf and Ponsnooth to the northern slope of Carn Menelez, and from Tarnon-dean through Perran-well (the Smelting-house glen) to Gilly.‡ As might have been anticipated, operations were undertaken in both; but—as speculations—they were alike unsuccessful; through, incidentally, they were of great interest.

At perhaps one-third of the distance between the Carnon embankment and Perran-wharf an artificial mound was raised above the level of high-water; and, through it, a shaft penetrated to the *(shelf)* rock, whilst drifts are extended, laying open both the tin-ground and the bed of vegetable matter above it. As the works were imperfectly ventilated, imflammable gas sometimes accumulated; and—more than once—the workmen, who worked with unprotected candles, were scorched by its explosion.§

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* For these particulars I am indebted to Mr. Richard Taylor, F.G.S.; and Mr. Charles Dyke Taylor.

† For this section I have to thank Mr. Whitley, C.E.; F.M.S.; Secretary of the Royal Institution of Cornwall.

‡ Henwood, *Cornwall Geol*: *Trans*: v, p. 60.

§ *Ibid*, viii, p. 453.

Some forty-five years ago* the surface of Perran-Well (Smelting-house) vale, at its confluence with the principal valley, was from four to six feet below the level of the highest tides;† from these, however,—as at the upper part of Carnon in earlier years—it was protected by an embankment, and wrought as an *open-work*. The ingredients with which it was then filled, to a depth of sixteen or eighteen feet, consisted of—

(1). Angular gravel, sand, and silt, the *débris* of various rocks and vein-stones stamped in upper parts of the principal valley, mixed with rounded masses of granite and slate from the neighbourhood; in numberless beds of unequal—but never of very great—thickness.. 12 to 15 feet;
At a considerable depth in this deposit the remains of deer occurred; and still deeper Oyster-shells were numerous.

(2). Fine silt, mingled with Oyster-shells, leaves, nuts, and branches of trees, amongst which the wing-cases of beetles might sometimes though very rarely be discerned ..... 6 to 18 inches;

(3). *Tin-ground;* consisting of small—more or less rounded—bodies of tin-ore; interspersed with angular and subangular blocks of schorl-rock, schorlaceous-granite, quartz, quartzose-slate, and other vein-stones of both the granite and the slate series of the district in much greater abundance ..... 2 to 3 feet;

The Shelf; of homogeneous, thick-lamellar, clay-slate, of silky lustre; traversed, almost meridianally, by a quartzose *cross-vein*, which was wrought throughout the entire width of the vale; and—some twelve or fifteen fathoms below the tin-ground—yielded considerable, though not quite remunerative, quantities of argentiferous lead-ore.

Granules and thin flakes of gold‡ were now and then—though very uncommonly—found in the tin-ground.

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* Pryce, *Mineralogia Cornubiensis*, p. 136. Thomas, *History of Falmouth*, pp. 48, 51. Barham, (C.). *Reports of the Royal Institution of Cornwall*, xlii, (1860), p. 16. Francis, (W.), *Gwennap; a Descriptive Poem*, p. 7. Henwood, *Journal of the Royal Institution of Cornwall*, iii, (1870), p. xvii.

† At Falmouth "average spring-tides may be considered as having a "rise and fall of 16 to 17 feet; and these rise to about 18 feet, and fall of "about 1½ feet, above the lowest veers. The neap-tides average a rise and "fall of about 7 feet, being at high-water, about 14 feet, and at low-water "about 7 feet, above the lowest veers." Thomas, (R.), *History of Falmouth*, "p. 43.

‡ "A piece of gold, in a matrix of quartz, from Carnon Vale, in the Royal "Institution of Cornwall, weighs 11 dwts. 6 grs." Michell, (J.), *Manual of* "*Mineralogy*, p. 2.

"Gold was found in the bed of the brook from Tarnon-dean upwards as far as Trewedna-water." Francis, (W.), *Gwennap; a Descriptive Poem*, p. 94.

My home was less than half a mile from this rivulet; but that any part of its course had been found auriferous, I never heard until now.

The remains of an ancient smelting-furnace, and of block-moulds in the rock are said to have been discovered between Pulla and Higher Coisgarne, in Gwennap;* and in the east of Kea a mass of Jew's-house-tin was found.†

About half-way from Tarnon-dean to the Arsenic manufactory,—towards the middle of the vale,—and at sixteen or eighteen feet below the surface, some two or three tons of large, rough, angular masses of quartz,—closely resembling those imbedded in the sub-soil of the neighbouring common were found resting on the bed (2) of silt, shells, and vegetable matter. Immediately beneath the stones,—and within compass of the layer of animal, vegetable, and mineral substances on which they rested—at some

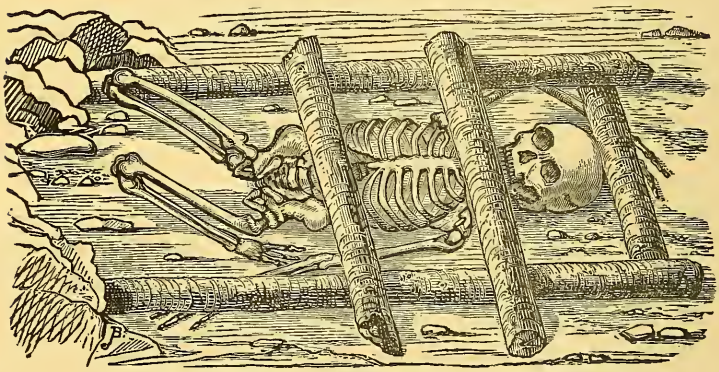
SKELETON

Discovered resting on the TIN-GROUND

BETWEEN TARNON-DEAN AND THE ARSENIC-WORKS, PERRAN-AR-WORTHAL.

DRAWN BY MR. H. M. GEOFFROI.

From a Sketch by the late REVEREND CANON ROGERS, M.A., of Penrose.



* "Some years ago Mr. Polkinghorne discovered [near Higher Cois-"garne-mill] an ancient furnace where tin was smelted and formed into "blocks. The furnace contained a large quantity of charcoal-ashes and "half-burnt wood; and the moulds for forming the metal into blocks were "found cut in the rock." FRANCIS, *Gwennap; a Descriptive Poem*, p. 100. *Parochial History of Cornwall*, p. 143.

† "Muriate of tin was first discovered in a specimen of Jew's-house-tin "....found in a low boggy ground in the Parish of Kea, accompanied by a "stratum of charcoal." MICHELL, (JOHN), *Manual of Mineralogy*, p. 74.

twenty-two feet below high-water, and four or five above low-water mark,* an entire human skeleton was discovered.

A rough balk, of about eight feet in length and six or eight inches in thickness, rudely hewn at the ends, lay on either side of,—nearly parallel to—but at some little distance from the body; that on the left resting on the—slightly extended—hand. Across these were placed two, somewhat similar, beams; one of which pressed on the lower ribs, whilst the other covered the mouth and chin. A third cross-bar, of much the same kind,—so much shorter that it did not reach either of the side-pieces,—rested on the (raised) right-hand, but scarcely touched the skull. No corresponding piece of timber, however, had been placed at the foot. The body lay on its back, inclined perhaps five or ten degrees from the horizon, and looked towards the north or north-north-west; the knees were raised, and the legs so drawn back that they were nearly parallel to the thighs, the heels, in fact had almost touched the hams; the right-arm extended obliquely above the head, the left—at a smaller angle—downwards.† The pelvis, other bones, and undecayed—but much-worn—teeth, shewed the remains to

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* Thomas, *History of Falmouth*, p. 31. *Ante*, p. 205.

† I am favoured, by Messrs. Heard, with the following extract from the *West Briton* of the 4th of April, 1823:—"On Saturday [the 29th of March, "1823] as the labourers employed at Carnon stream-works were removing "a quantity of mud, they discovered a heap of stones, under which were "four pieces of oak enclosing a human skeleton, the teeth and larger bones "of which were in nearly a perfect state. The tomb was covered with a "deposit of mud 17 feet in depth, and was 22 feet below the present [high] "water mark, on what is denominated the "tin-ground," namely, stones "mixed with gravel amongst which tin is found. The four pieces of oak are "each about 8 feet in length, roughly hewn, and about 8 inches in diameter. "One of these pieces lay on each side of the body; the other two were laid "across these, over the breast, the stones were piled over the whole. The "wood is more decayed than the timber found in these stream-works "usually is."

To the Reverend Saltren Rogers, M.A., Vicar of Gwennap, I am indebted for the following contemporary memoranda, and for the sketch from which the accompanying wood-cut was prepared, discovered by his brother, Mr. John Jope Rogers, of Penrose, amongst the papers of their late father the Reverend Canon Rogers, M.A.

From a printed paper; apparently part of a Newspaper; dated 7th of April, [1823.]

"The skeleton was found in a bed of soft clay containing shells, 17 feet "below the surface, 22 feet below high-water mark, and one foot above the "*tin-ground*, lying in a direction across the valley, with the head nearly

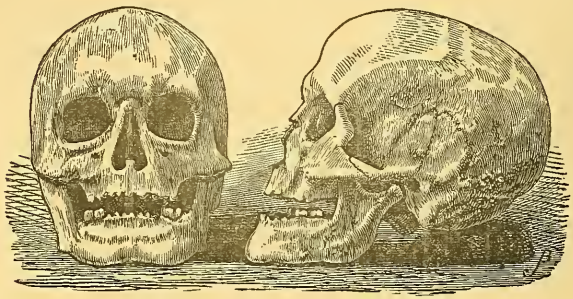
be those of a man, not exceeding five feet five inches in height, and, probably, much beyond middle-age.*

SKULL

Of the Skeleton discovered at

PERRAN-AR-WORTHAL.

From a Photograph by Argall, of Truro.†



" south, and the feet nearly north. A piece of rough elm was placed at the " head, and a piece of the same cut to the length of 8 feet, on each side of " the skeleton, two pieces of the same length were placed at right-angles, " one across the head, and the other across the breast. No wood was placed " at the feet. The circumstance most worthy of remark is the posture of " the skeleton. The head and breast were a little raised above the rest of " the body. The left arm was extended a little from the side, and *the piece " of elm on that side rested on the hand.* The right arm was raised with the " hand above the head; and *the elm head-piece rested on the hand.* The knees " were inclined upward....and the feet were bent back under the top of the " thigh-bones, and *rested on the tin-ground.* The skull, ribs, and all the " bones appeared on close examination to be perfectly sound, except a partial " decay of a few of the vertebræ, and were not at all mineralized. A pile of " stones was heaped on the skeleton, containing five barrows-full; some of " the largest were computed to be about 70 or 80lbs. weight."...." The skull, " teeth, horns, and some vertebræ of a stag of the red-deer species have " been since found near the spot, about eight feet below the surface." " No " hair, cloth, or any other substance, except the elm, was found near the " skeleton."

From Manuscript Notes, which accompanied a Sketch, by the Reverend Canon Rogers, M.A.

" The elm was eight feet long and six inches thick, cut off at both ends with an axe....The pile of stones was two feet high."

* For these particulars I am indebted to my friend DR. JAGO, F.R.S.; who was assisted in his enquiries by Mr. E. Sharp, M.R.C.S.; and Mr. A. L. Salmon, M.R.C.S.

† Taken under the direction of DR. JAGO, F.R.S.

Of clothing, ornament, tool, or weapon no trace was discovered.

The works were carried on by a Company* which had recently established, in the immediate neighbourhood, the first manufactory of *white arsenic* (arsenious acid)† in the United Kingdom; and both were superintended by Mr. John Rowse,‡ a person of much information, sagacity and prudence. The stones, gravel, and silt were, therefore, carefully removed, and the skeleton as well as the wood which surrounded it, were scrupulously protected from displacement, until they had been carefully examined. And in order to satisfy the deep and general interest which prevailed, the remains were, for some time, open to public inspection; and—as my home was scarcely a mile distant,—I visited the spot daily. At length the skeleton was taken into safe keeping; and in 1827 it was presented to the *Royal Institution of Cornwall.*

The central district,§ which attains, at Hensbarrow, an elevation of more than a thousand feet,‖ consists of granite, of slate sometimes interlaid with hornblendic rocks¶ sometimes charged with organic remains,** and of *elvans* intersecting both granite and slate. A considerable part of this region affords the slightly-coherent talcose granite,†† whence the manufacturers of porcelain,

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* Boase and Courtney, *Bibliotheca Cornubiensis*, i, p. 136.

† Henwood, *Cornwall Geol: Trans:* v, p. 86.*

‡ *Ibid*, iv, p. 162.

§ This district is bounded by a line drawn from Wadebridge to Lostwithiel; and by another line through Truro-river to the Gannel. Boase, *Cornwall Geol: Trans:* iv, p. 234.

"Lanivet Tower, two miles west of Bodmin, is by common repute the centre of Cornwall."

Wallis, *Bodmin Register*, p. 103; *Cornwall Register*, p. 199.

‖ *Trigonometrical Survey.* De la Beche, *Report on the Geology of Cornwall, &c.*, pp. 7, 14.

¶ Boase, *Cornwall Geol: Trans:* iv, pp. 262, 276. De la Beche, *Report*, p. 82. Phillips, (J. A.), *London, Edin: and Dublin Phil: Mag.*, xli, pp. 97, 99.

** De la Beche, *Report*, p. 351. Henwood, *Cornwall Geol: Trans:* v, pp. 125, 158.

†† Bonnard, *Journal des Mines*, xiv, p. 448. Deluc, *Geological Travels* iii, p. 342. Berger, *Geol: Trans*: (O.S.), i, p. 125. Thomson, *Annals of Philosophy*, ii, p. 349. Fitton, *Ibid*, iii, p. 180. Conybeare, (J. J.), *Ibid*, v, p. 186. Dufrénoy, De Beaumont, Coste et Perdonnet, *Voyage Métallurgique en Angleterre*, ii, p. 187. Boase, *Cornwall Geol: Trans*: iv, p. 235; *Phil: Mag: and Annals*, x, p. 348. Hawkins, *Cornwall Geol: Trans*: iv, p. 475. De la Beche, *Report on the Geology of Cornwall, &c.*, pp. 159, 509. Henwood, *Cornwall Geol: Trans*: v, p. 115.

as well on the Continent as throughout the United Kingdom, procure most of their materials.* Throughout the granitic tract schorl is more or less abundant; and, here and there, it prevails;† generally, however, associated with quartz or with felspar, and sometimes with both. Nor are associations of schorl with quartz and felspar peculiar to rocks of massive structure; for the same substances—especially the first two—are not uncommon, in their alternations displaying every imaginable involution and displacement, amongst the slates which adjoin the granite.‡ Westward the schistose rocks are mostly of dark blue and greenish grey hue, and their structure is thick lamellar, but occasionally they cleave rather imperfectly.§ Eastward, however, they assume various shades of pale-blue, greenish-grey, red, and dark brown, and here their cleavage is more decided, and their texture softer.‖ To-

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* The following columns show the enormous increase in the export of China-stone and China-clay which has lately taken place.

Years.	China-stone.	China-clay.
1809	1,162 tons	1,757 tons.
1816	2,135 ,,	1,775 ,,
1826	5,000 ,,	7,490 ,,
1838	7,344 ,,	20,784 ,,
1858	21,983 ,,	83,113 ,,
1868	29,000 ,,	100,000 ,,
1870	32,500 ,,	110,520 ,,

Lysons, *Cornwall*, p. ccxi. *Cornwall Geol*: *Trans*: i, p. 233; iii, p. 360; v, p. 478. Hunt, *Mineral Statistics*, 1858, p. 2; 1868, p. 139; 1871, p. 443.

† Deluc, *Geological Travels*, iii, p. 343. Conybeare, (J. J.), *Annals of Philosophy*, v, p. 188. Von Oeynhausen and Von Dechen, *Phil*: *Mag*: *and Annals*, v, p. 241. Sedgwick, *Proceedings of the Geological Society*, i, p. 283. Boase, *Cornwall Geol*: *Trans*: iv, p. 238. Hawkins, *Ibid*, iv, p. 476. Henwood, *Ibid*, v, p. 122. De la Beche, *Report*, p. 159.

‡ "On the confines of the granite...alternate layers generally of great "tenuity, of very minutely granular quartz and schorl, have all the aspect "of a stratified mass." Conybeare, (J. J.), *Annals of Philosophy*, v, p. 189. "A very interesting form of this rock consists of alternating layers of "black and white minerals, exhibiting the most complicated curves and con- "tortions....The black are of...schorl-rock, the white of quartz which is "generally more or less combined with felspar....This kind of schorl-rock "is very abundant in the diluvium on Tregoss Moors." Boase, *Cornwall Geol: Trans*: iv, p. 245.

§ Boase, *Ibid*, iv, pp. 275, 278. Henwood, *Ibid*, v, p. 125. Phillips, (J. A.), *London, Edin*: *and Dublin Phil*: *Mag*., xli, p. 90.

‖ Boase, *Cornwall Geol*: *Trans*: iv, p. 286. Henwood, *Ibid*, v, p. 125. De la Beche, *Report*, pp. 80, 82.

wards the south-east they assume an arenaceous character, and are charged with organic remains.* The *elvans* which traverse the western—but do not reach the eastern†—part of this district, are well known, and have been frequently described.‡ The *lodes* take a mean direction of about 13° N. of E.—S. of W.,§ but—as in other regions—they are not strictly parallel; their divergences, however, are by no means uncommon. Throughout the County their average dip is about 70°, but in this neighbourhood it scarcely exceeds 60°.|| In the massive-felspathic, and soft schistose, rocks on the E. and S.E. they yield copper-ore only;¶ but in the hard, quartzose, thick-lamellar slate, in the schorl-rocks, and in the granite towards the N. and W.—though they are sometimes sprinkled with the compounds of nickel, of cobalt, of uranium,** and of antimony—tin-ore prevails.†† But *lodes* are not only the repositories of tin-ore; for in this neighbourhood‡‡

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* De la Beche, *Report*, p. 351. Henwood, *Cornwall Geol*: *Trans*: v, pp. 125, 158.

† Henwood, *Cornwall Geol*: *Trans:* v, p. 126.

‡ Bonnard, *Journal des Mines*, xiv, p. 446. Hawkins, *Cornwall Geol*: *Trans*: i, p. 150, *Pl.* 5. Boase, *Ibid*, iv, pp. 277, 279. Henwood, *Ibid*, v, pp. 126, 160. De la Beche, *Report*, pp. 181, 332.

§ Henwood, *Cornwall Geol*: *Trans*: v, p. 250, *Table*, ciii; *Journal of the Royal Institution of Cornwall*, No. 13, p. xvi. De la Beche, *Report*, p. 305.

|| Henwood, *Cornwall Geol: Trans:* v, p. 247; *Annales des Mines*, 6me Série, ii, p. 172.

¶ De la Beche, *Report*, p. 335. Henwood, *Cornwall Geol*: *Trans*: v, p. 128.

** Williams, (R. H.), *Reports of the Royal Institution of Cornwall*, xxxix, p. 32.

†† Borlase, *Natural History*, p. 18. Jars, *Voyages Métallurgiques*, iii, p. 108. Bonnard, *Journal des Mines*, xiv, p. 446. Hawkins, *Cornwall Geol*: *Trans*: i, p. 146; iv, p. 476. Carne, *Ibid*, ii, p. 92. Von Oeynhausen and Von Dechen, *Phil*: *Mag*: *and Annals*, v, p. 241. Sedgwick, *Ibid*, ix, p. 284. Boase, *Cornwall Geol*: *Trans*: iv, p. 276. Henwood, *Ibid*, v, p. 120, *Tables*, lxxxiv, lxxxv.

‡‡ "Il existe pour ainsi dire partout, aux environs de Saint Austell, soit "à la surface, soit à quelque profondeur, dans la plus grande partie des "plaines incultes, où il y a de petits filets d'eau. On peut, en prenant une "pelletée de la terre tourbeuse, qui est à la surface, et l'exposant au courant "du ruisseau, obtenir par le lavage une quantité sensible de minerai d'étain "en particules très-fines, qui se précipitent tout de suite, et que l'on purifie "par plusieurs lavages successifs. C'est aussi ce que l'on fait dans beaucoup "d'endroits avec bénefice." Bonnard, *Journal des Mines*, xiv, p. 450.

especially,—and to a less extent in several other districts*—it is scattered through—and, so to speak, forms an integrant part of—the granite;† and in the slate series, north of the granite, tin-ore is interlaminated with schorl and quartz.† All—save one of—these spots have, however, remained unwrought for many years. In, and on the confines of, the district iron-ores abound.‡

The detrital deposits of tin-ore on the west and south have been often and minutely described,§ but they are now nearly if not quite exhausted; those towards the north and east have however, attracted less notice,‖ and on some of them operations are still carried on.

A comparatively low ridge of slate stretches—some 30° W. of N.—E. of S.—from the granite of Hensbarrow¶ to that of Belovely Beacon, dividing the upper waters of the Roche (Par)

"Carclase tends to unfold the origin of the tin-ore scattered in grains "over the bottom of some of the Cornish valleys;...the whole mass of the "*growan* composing the eastern part of the hill, contains these grains....The "strata containing the greatest abundance of tin grains are harder [than the "rest] but they are easily decomposed." De Luc, *Geological Travels*, iii, p. 342.

"The enormous open-work of Carclase is excavated in a variety of "decomposing stanniferous granite or schorl rock." Sedgwick, *Trans*: *Cambridge Phil*: *Society*, i, p. 108.

Sedgwick, *Geol*: *Trans*: iii, (N.S.), p. 483. Henwood, *Cornwall Geol*: *Trans*: v, p. 119.

* On Dartmoor (Berger, *Geol: Trans:* i, (O.S.), p. 120); at Saint Just (Henwood, *Cornwall Geol*: *Trans*: v, pp. 15, 235); in Breage (*Ibid*, p. 53); and at St. Cleer (*Ibid*, viii, p. 664.)

† Boase, *Cornwall Geol: Trans*: iv, p. 252. Henwood, *Ibid*, v, p. 120 Note*.

‡ De la Beche, *Report*, pp. 303, 617. Henwood, *Cornwall Geol*: *Trans*: v, p. 128.

§ *Ante*, p. 191.

‖ Henwood, *Cornwall Geol*: *Trans:* iv, p. 60. De la Beche, *Report*, p. 405.

¶ Hensbarrow ....is 1,034 feet above the sea;—
Killivreth Down ,, 1,000 ,, ,,
Castle an Dinas ,, 729 ,, ,,
Belovely Beacon ,, 765 ,, ,,
Helmen Tor ,, 687 ,, ,,

De la Beche (Maclauchlan), *Report*, pp. 14, 16.

river from those of the Fal;* but both flow southward into the British Channel.† A similar, but perhaps a rather lower range, of like character extends—perhaps 25° E. of N.—W. of S.—from the granite near the Indian Queens to that of Castle an Dinas;* thus separating the tributaries of the Ladock rivulet—a branch of the Fal—from those of the Gannel and of the (Saint Columb-minor) Porth brook; both which run northward to the Bristol Channel.

As the Roche river is traced upward through the moors north-east of Hensbarrow the *stream-works* mentioned hereafter are passed in succession.

At *Pendelow* in Saint Austell the detrital deposits—wrought since 1828‡—now present the undermentioned section;—

(1). Granitic sand and gravel, divided by thin partings of hardened silt into many separate beds ..... 6 to 8 feet;—

(2). Peat *(fen)*; often mixed with, and sometimes interlaid by microscopic layers of,§ granitic sand ....0·3 foot ,, 2 ,, ;—

(3). Granitic sand and gravel in many thin layers; the lower of them much mixed with hardened mud. 7 ,, 8 ,, ;—

(4). Peat, very closely resembling No. 2..... 1 foot;—

(5). Granitic sand and gravel, scarcely differing from No. 1 ..... 3 to 6 inches;—

(6). Peat§; sometimes mixed with stems of fern, nuts, leaves, branches of furze, alder and hazel, and trunks of oak. Here and there, but very rarely, a few flints have been discovered..... 1 foot;—

(7). The *tin-ground*, consisting of granitic, schorlaceous and quartzose matter mixed with the oxide of tin, usually in the state of sand and gravel; but sometimes it includes subangular masses of various granitic rocks and vein-stones; and—yet more rarely—thin scales of slate also..... 2 to 4 feet;—

The *(Shelf)* rock beneath is granite of ordinary texture, sometimes moderately hard, but usually more or less disintegrated; in such cases, however, it is often deeply eroded, and in these erosions the ore is often richer than in the *tin-ground* proper.

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* Polwhele, *History of Cornwall*, i, p. 183. Lysons, *Cornwall*, p. clxxxvii. Gilbert, (C. S.), *Historical Survey of Cornwall*, i, p. 405. Hitchens and Drew, *History of Cornwall*, i, p. 521. *Ante*, p. 212.

† Thomas, (R.), *History of Falmouth*, p. 15.

‡ Henwood, *Cornwall Geol*: *Trans*: iv, p. 63.

§ Specimens of this peat were obligingly submitted to microscopic examination by Mr. Ralfs, F.R.C.S.

Levrean, in the same parish, now displays;—

(1). Granitic sand and gravel ..... 1 foot;—

(2). Peat *(fen);* often mixed with, and sometimes divided by exceedingly thin layers of, granitic sand..... 1 ,, ;—

(3). Granitic matter *(the Upper tin-ground);* small subangular masses of felspar, quartz and white mica, mixed largely with schorlaceous matter, with particles and granules of tin-ore in smaller proportions, and, in rare instances, with minute specks of gold .. 3 to 6 feet;—

(4). Angular and subangular masses of granite imbedded in granitic sand; altogether destitute of tin-ore *(False shelf*)* ..... 1 ,, 1·3 foot;—

(5). The *tin-ground,* comprehending angular and subangular bodies of granite. felspar, quartz, schorl, and various vein-stones, mixed with granitic gravel and sand, as well as with grains and particles of oxide of tin; and, still less frequently, with flakes of schistose matter and specks of gold .....10 to 15 feet;—

A few ancient shovels—some made wholly of wood, others bound at the edges with iron†—have been found, from time to time, in distant parts of this bed.

The *(Shelf)* granite beneath is of ordinary texture, unequal hardness, and, generally of reddish hue; its surface is remarkably uneven, and the depressions in it are often the richest repositories of tin-ore.

At *Pit-moor,* also in Saint Austell, the successive deposits consist of;—

(1). Vegetable mould ..... 1 foot;—

(2). Granitic sand and gravel, in many separate layers, but all of like character ..... 2 to 3 feet;—

(3). ,, ,, mixed with subangular masses of granite and of schorl-rock..... 3 ,, ;—

(4). The *tin-ground,* made up of angular, subangular, and rounded masses of granite, quartz, schorl-rock, and schorl, with similar bodies of various vein-stones and small quantities of tin-ore, of different sizes, but mostly very small. Laminæ of clay-slate are sometimes, but very rarely, mixed with the other ingredients ....3 to 10 feet;—

The granitic matter *(Shelf)* beneath, is of ordinary texture, but usually it is very soft, so soft, indeed, that portions of it—on being laid open—flow forth in a semi-liquid state.

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* Henwood, *Cornwall Geol: Trans:* iv, p. 62.

† The workmen use "a broad Shouell, the vtter part of yron, the middle "of Timber, into which the staffe is slopewise fastned." Carew, *Svrvey of Cornwall,* f. 10.

Pendelow is drained by aid of a water-wheel about six feet in diameter; from *Levrean* and *Pit-moor* the water escapes through open drains.

The bed and banks of a brook which rises in Red-moor, north-east of Helmen-Tor,* bear—near its confluence with the Roche river—traces of having been ransacked at some earlier period; but at present they remain unwrought. Nearer to its source, however, operations—though on a very small scale—are still continued.† But, notwithstanding they are within two miles of *stream-works* still in progress on the moors of Saint Austell, and occupy neighbouring portions of the same granite, the detrital deposits worked in them are of widely different character.

Lower Creany, a part of Red-moor, in Lanlivery, exhibits;—

(1). Peat ..... 2 to 3 feet;—

(2). Granitic (though slightly quartzose) clay of greyish hue, mixed with laminæ of slate .....1 foot to 3 „ ;—

(3). The *tin-ground*, composed of angular, subangular and spheroidal masses of pale-brown quartz, fragments of felspar, mottled—dark-blue and yellowish-brown—clay, and granitic gravel; thinly mixed with rounded masses of tin-stone and both perfect and fractured crystals of tin-ore. Flints of considerable size occur at intervals, and particles of gold less frequently ..... 4 to 5 feet;—

The roots of marsh-plants penetrate, to a depth of 2 or 3 feet, into the *tin-ground*.

The *Shelf*,—of pale buff-coloured clay—presents a very uneven surface.

At *Upper Creany (Wheal Prosper)*—in the same parish, and, indeed, in an adjoining part of the same swamp—the order of succession is;—

(1). Peat‡ ..... 6 inches;—

(2). Granitic clay, frequently mixed with laminæ of yellowish slate .....1 foot to 3 feet;—

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* "The *Helmen Tors*...display...one or two secondary Logan rocks." *Parochial History of Cornwall*, iii, p. 32.

† "In 1853, a curious image, about nine inches high, made of tin, and "representing a man, was found nine feet beneath the ground in a Jew's "house or stream work in Lanlivery parish. It weighed 9 lbs., and had "some Hebrew [characters] on it." ALLEN, *History of Liskeard*, p. 27. Note.

‡ Some few years since this peat was quite three feet thick; but, of late, the neighbouring cottagers have taken great part of it for fuel.

(3). The *tin-ground*, including small angular and rounded bodies of ferruginous and milk-white quartz, masses of crystalline felspar, and of granitic matter, of quartzose and schorlaceous vein-stones, and of tin-stone, all in the state of sand and gravel, mixed with minute unfractured crystals of tin-ore. Microscopic particles of gold are sometimes scattered through the other ingredients ..... 4 ,, 5 feet;—

The roots of marsh plants penetrate the *tin-ground*.

The *Shelf*—of mottled blueish and brownish clay—exhibits frequent and deep undulations; in the hollows of which the *tin-ground* is usually most productive.

The works are drained by aid of a water-wheel four feet in diameter.

The Tregoss moors approach the granite of Castle an Dinas and of Belovely Beacon on the north, and that of the great eastern-central range on the south, without actually touching either.*—They are bounded towards the north-north-west and north-north-east by slight elevations—scarcely to be called *ridges*—of slate, which direct their drainage to the Fal. The entire tract is within the slate-series; but in many spots the rock is so soft that it bears scarcely a trace of schistose structure, and much of it is, in fact, mere laminated clay.† The slate is traversed by several *(Elvan-courses)*‡ porphyritic dykes composed, in great part, of felspar and quartz; one of which is slightly sprinkled with tin-ore at its outcrop.§ *Lodes* have been wrought in several parts of the neighbourhood; but, hitherto, with little success.||

Some forty or fifty years ago the Tregoss Moors¶ exhibited an almost countless succession of low, stony, hillocks, and deep, weedy, pools, the abandoned scenes of earlier operations.** Amongst

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* Boase, *Cornwall Geol: Trans:* iv, p. 248. De la Beche, *Report*, p. 86.

† Boase, *Cornwall Geol: Trans*: iv, p. 248.

‡ De la Beche, *Report*, p. 180.

§ *Postea*, p. 217.

|| Boase, *Cornwall Geol*: *Trans:* iv, p. 250. Henwood, *Ibid*, p. 235.

¶ I am indebted to the kindness of Mr. Whitley, C.E., F.M.S., for a copy of his instructive Geological Map of the Tregoss-moors; and to Mr. H. Michell Whitley, C.E., for a tracing from a survey made, some forty years ago, by the late Mr. Richard Thomas, C.E.

** At some distance from both their cottages and their work the *Tin streamers* build little turfen shelters for the nests of their *store*-geese. As soon as they are hatched, therefore, the goslings find suitable food in neighbouring pools, marshes, rills, and scattered patches of grass. As harvest approaches some two or three thousand young geese are sold off the moors to farmers, who fatten them on the stubbles of several adjoining parishes.

them, however, many small *tin-stream-works* were still industriously wrought, by speculative workmen, either on ancient *detritus (whole-ground)*, or on matter imperfectly gleaned by their predecessors. The works were drained either by *open-cuttings*;—by hand-pumps;—or by little *lifts* worked by water-wheels, which seldom exceeded, and were often less than, six feet in diameter. Great part of the tract—at length exhausted of tin-ore—has been, for some time, successfully cultivated, and in the portion yet unenclosed a few inconsiderable spots only are now under treatment.

On the northern side of the Moor three sections are still open to inspection.

At *Golden-stream*, about half a mile south-east of Castle-an-Dinas, in Saint Columb-major, ancient works, which have been lately resumed, exhibit—

(1). Vegetable mould ..... 6 inches;—

(2). Angular and subangular masses of slightly micaceous clay-slate, compact and thick-lamellar schorl-rock,* quartz, many vein-stones of the slate series, and here and there a stone of granite mixed with felspathic clay, and other disintegrated ingredients of the almost-adjoining *elvan-course* ..... 5 to 6 feet;—

Large lumps of peat are imbedded in portions of this *detritus* which had been previously moved.

(3). The *tin-ground* scarcely differs from the matter which overlies it, except that *elvan* is more abundant, and that small proportions of tin-ore—usually in a state of gravel or sand, but sometimes as minute unfractured crystals—are mixed with the other ingredients 2 ,, 3 ,,

The *Shelf*—at the part now under treatment—is disintegrated *elvan* containing, here and there, a few particles of cassiterite.

Wet and Dry almost adjoins *Golden-stream*, and differs from it so slightly, that a repetition of the same detail seems unnecessary.

Immediately north-west of a railway-bridge over the high-road between Lanivet and the Indian Queens, both the refuse of earlier *streamers* and unwrought *(whole)-ground* are now laid open in the

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* "Felspar, quartz, and shorl, either uniformly mixed and blended together, or arranged in alternate stripes and layers [occur at] Castle-en-Dinas, and the adjacent hills which bound the Tregoss Moors on the north." Boase, *Cornwall Geol*: *Trans*: iv, p. 253.

same broad, shallow, pit.* The undisturbed portion consists of,—

(1). Vegetable mould ..... 6 inches to 1 foot;—
(2). Angular and subangular bodies of quartz, clay-slate, laminated schorl-rock, *elvan*, and of various vein-stones from the slate formation, with—here and there, but very rarely—a few stones of granite..... 3 ,, ,, 4 feet;—
(3). The *tin-ground*, which closely resembles the *overburden;* save that it is thinly mixed with both rounded masses and perfect crystals of tin-ore, but all of exceedingly small size .. 1 foot to 2 feet;—

The *Shelf* consists of clay-slate, moderately hard and very fissile in some places; but in other it is merely laminated clay.

The hamlet of Tregoss and the tenement of Pendean occupy (so to speak) a peninsula, which projects, from the eastern end, far through the middle of the moors. Though scarcely higher than many heaps of rubbish left by early workmen, it bears neither trace of erosion nor fragment of detritus.†

On central portions of the region operations have been, long since, discontinued; but towards the southern margin—where detrital deposits approach the eastern-central range of granite—a few workmen still glean small quantities of *stream-tin-ore* as long as—but no longer than—the rains of winter and spring supply them with water.

At *Gun-deep*, in Saint Dennis, a pit has been sunk through—

(1). Vegetable mould ..... 6 to 12 inches;—
(2). A mixture of micaceous clay-slate, laminated schorl-rock, quartzose slate, quartz, *elvan*, and occasional stones of granite ..... 4 feet;—
(3). Peat ..... 1 foot;—
(4). The *tin-ground* was not thought worthy of being wrought.

At *Gaverigan*—a south-western part of Tregoss moors—near the confines of Saint Dennis and Saint Columb-major,‡ a mixture of angular, subangular, and rough spheroidal masses of various rocks

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* Now (1873) wrought by William Tellum and John Moss.

† "Several patches on these moors are, indeed, enclosed, and brought into tillage; such parts, however, are higher than the general surface of the moor, to which circumstance their superior fertility may be owing, the more elevated ground having been exempted from the diluvium that covers the lower levels." Boase, *Cornwall Geol*: *Trans*: iv, p. 248.

‡ Rashleigh, *British Minerals*, i, p. 3; *Pl.* i, *Fig.* 3.

common in the neighbourhood, has been laid open, for, perhaps an acre in extent and to a depth of twenty feet or more. In the deepest parts several *(levels)* drifts have penetrated the *detritus;* but, for some time, operations have been discontinued.

West of the ridge which divides the southern from the northern drainage* both banks of a brook which rises in Tregurthy Moor,* south west of Castle-an-Dinas, and falls into the Bristol Channel at Porth in Saint Columb-minor, exhibit traces of ancient *stream-works;* but, within memory, one spot only has been wrought in the lower part of its course.

Some forty-five years ago many of my relatives† lived within a mile of the ancient entrenchment on Trevelguè-island;‡ and—whilst visiting them—I had frequent opportunity for examining the *stream-work,* then under active operation at Treloy§ in the immediate neighbourhood. Where—beneath the soil

(1). Successive layers of sand and gravel alternate, to a depth of 8 or 10 feet;—
(2). Vegetable remains ..... succeed ,, 2 or 6 inches;—and
(3). The *Tin-ground,* which.. varies in thickness from 6 inches to 2 feet.

As every part of this deposit, wrought during memory of the generation now passing away, was beyond high-water-mark at Porth and even above level of the *raised-beach* at Fistral near Newquay,‖ it contained neither shell nor other substance of marine origin,¶ but frequently afforded granules of gold.**

The *Shelf* is of light blue and pale-buff-coloured, fissile, clay-slate.

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* *Ante,* p. 216.

* From this spot the earliest specimens of *wood-tin-ore* were obtained. Phillips, *Mineralogy,* (3rd edition), p. 253. Michell, *Manual of Mineralogy,* p. 72.

† Lysons, *Cornwall,* p. 66. Hitchens and Drew, *History of Cornwall,* ii, p. 173. *Parochial History of Cornwall,* i, p. 242.

‡ Henwood, *Journal of the Royal Institution of Cornwall,* iii, (1869), p. x.

§ Henwood, *Cornwall Geol: Trans:* iv, p. 65. De la Beche, *Report,* p. 405.

‖ "North of the signal-station at Newquay is a bed of shelly sandstone "....and the same occurs in the cliffs around Fistral Bay, forming an exten- "sive horizontal bed which rests on the edges of the slate...The sandstone "of Fistral does not contain so large a portion of shells as that of Newquay; "and the lower part consists almost entirely of pebbles forming a kind of "conglomerate....These beds of pebbles and sand are situated just above "high-water-mark." Boase, *Cornwall Geol: Trans:* iv, p. 259.

Paris, *Ibid,* i, p. 6. Pattison, *Ibid,* vii, p. 50. Tweedy, *Ibid,* p. 55. De la Beche, *Report,* p. 405. Sedgwick and Murchison, *Geol: Trans:* v, (N.S.) p. 284.

The *Ordnance Geological Map* (Sheet xxx,) indicates the remains of a Submarine forest near the outlet at Porth.

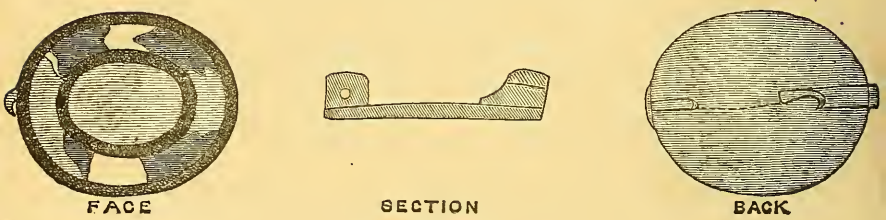
¶ De la Beche, *Report,* p. 405.

** "The *stream-tin* obtained at Treloy was frequently mixed with grains "of gold; mostly about the size of wheat, but sometimes as large as pease." Mr. John Nicholls, Proprietor of Treloy, MS.

In a part of Treloy which bore no trace of previous operations at the surface, it was found that workmen of an earlier period had already examined the *tin-ground.* From amongst the refuse of their labours the hereinafter mentioned objects were obtained.

The *Fibula* (*Fig.* 4,)—now in the Museum at Truro—was imbedded, amongst previously moved sand and gravel, somewhat above the level of the *tin-ground* which had been already wrought; and was bought of the finder, (a workman on the spot), on the day it was found. It is of bronze, inlaid with a narrow oval (? of porcelain) disposed in symmetrical breadths, alternately of blue and white.

Fig. 4. Inlaid Fibula of Bronze. From Treloy, Saint Columb-minor. Discovered amongst sand and gravel which had been previously moved. *Presented to the* Royal Institution of Cornwall *by W. J. Henwood.* From a Drawing by Mr. H. M. Whitley, C.E.



Full Size.

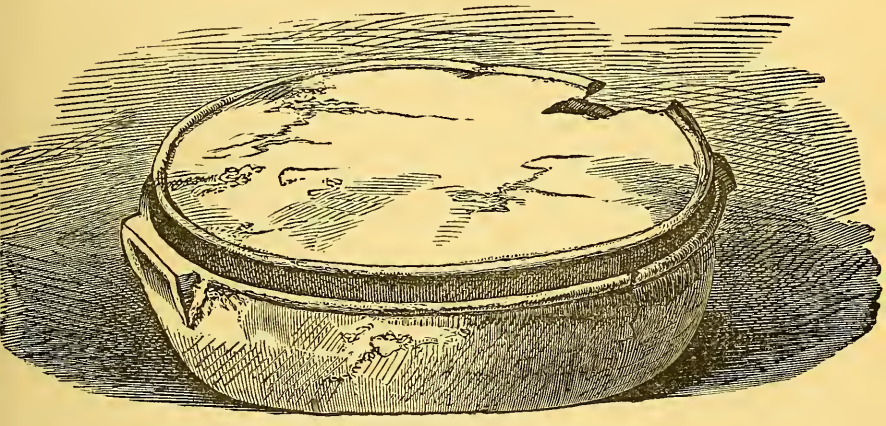
The pan and cover (*Fig.* 5.) were discovered within a few yards of the *Fibula;* in a part of the *tin-ground* which bore evident proof of having been previously examined, notwithstanding it was overlaid by several thin, undisturbed, beds of sand and gravel.

Rims of perhaps twice the ordinary thickness of the vessel and its cover surround the edges of both; and both are thinly encrusted with earthy matter of leaden hue; the metal having, possibly, become reoxidized,* like the *Jew's-house-tin* of Kea and

* Michell, (J.), *Manual of Mineralogy*, p. 74. Collins, *Journal of the Royal Institution of Cornwall*, iv, (1872), No. xiii, p. 83. *Ante*, p. 206, *Note* †.

Tremethick, only in a smaller degree. These remarkable articles —together with some *Stream-tin-ore* from the same place—were taken to Trethellan-house for sale; and, as assay showed them to be of the purest metal, both were bought for conversion into some

Fig. 5. Tin Pan and Cover. From Treloy, Saint Columb-minor. Discovered in Tin-ground which had been previously wrought. *Presented to the* Royal Geological Society of Cornwall *by H. S. Boase, M.D., F.R.S., F.G.S.*, of Dundee. Drawn by Mr. H. M. Geoffroi.



Diameter 14 inches. Depth 4·75 inches. Thickness 0·12 inch.

saleable shape. Happily, however, Dr. H. S. Boase,—then a Partner in the Smelting Company—was present at the moment, and preserved them from destruction.

Between Lanherne and Mawgan Porth several alternations of mud, sand, and gravel, here and there mixed with large stones, overlie a mingled mass of branches, leaves, nuts, and other vegetable remains, which rests on a thin bed of poor *tin-ground.**

Early in the fourteenth century more than two-thirds of the

* Mr. William Leddicote, Superintendent of the works, MS.

tin-ore obtained in Cornwall was from this district;* and, probably the greater part was detrital. Three hundred years later the returns from East Cornwall had dwindled to less than one-sixth of their previous amount; and at present they are comparatively

* The following columns show the quantities of tin on which duties were paid to the Duchy of Cornwall, at the several Coinage towns, during different periods:—

Periods.

Towns.	1305—1306. Total. One year.	1577—1607. Average of forty years.	1837—1838. Total. One year.
Calstock	....	....	73·7 tons, Avoir.
Bodmin	74·3 tons, Avoir:	....	....
Liskeard	....	22·3 tons, Avoir.	....
Lostwithiel	201· ,, ,,	38·1 ,, ,,	....
Saint Austell	....	....	....
Truro	68·7 ,, ,,	167·1 ,, ,,	1,930·7 ,, ,,
Toynu [? Truro]	36·3 ,, ,,	....	....
Helston	6·1 ,, ,,	193·3 ,, ,,	....
Hayle	....	....	1,022·2 ,, ,,
Penzance	....	....	2,329·3 ,, ,,
Total	386·4 ,, ,,	.....	5,355·9 ,, ,,
Average	....	420·8 ,, ,,	....

The Coinages were held at the several privileged places during the undermentioned times; viz:—

Towns.	16th Nov., 1305—21st Sept., 1306.	1687—1835.	1835—1838.
Calstock	....	....	8
Bodmin	4	....	....
Liskeard	....	8	....
Lostwithiel	22	24	....
Saint Austell for Charlestown and Pentuan	....	....	16
Truro	4	48	48
Toynu [? Truro]	2	....	....
Helston	1	8	16
Hayle	....	....	24
Penzance	....	8 24 From 1753,	48

A Coinage being thus eventually established at every port in the tin districts.

insignificant. Many mines have been wrought within its circuit;

MACLEAN, *Journal of the Royal Institution of Cornwall*, iii, (No. xii), p. 238; iv, (No. xv), p. 187. HENWOOD, *Coinage Lists* 1835—1838.

For several years before the Coinages were rearranged (in 1835) Officers attended at the Prince's Halls, in Truro, Helston, and Penzance, during two days each in the first and second months of every quarter; on every *(piece)* block of tin, coined at such times, however, a fee of one shilling was paid by the smelter.

In 1305—6	{the (*pieces*) blocks varied from ....}	86 to 242,	{and averaged about 120 lbs. (Avoir.) in weight;	
From 1577 to 1607.	,, ,,	308 ,, 346,	,, ,,	328 ,,
During 1837—8,	,, ,,	390 ,, 450,	,, ,,	420 ,,

From the foregoing particulars it may be presumed, that the *(pieces)* blocks of tin were conveyed to the Coinage-halls—

in .... 1305— 1306 .... mostly on beasts of burthen;—
from 1577 to 1607 .... ,, in carts;—
during 1837 — 1838 .... in carts and waggons only;—

and thus we may, perhaps, obtain some idea of the roads at different times.

Between the coast and the interior of Brazil all traffic is, even now, conveyed by mules; which travel from (3 to 4 leagues) 12 to 16 miles per day, carrying for many weeks in succession—loads of between (10 and 12 *arrobas*) 320 and 380 lbs. each.

"It hapned, that certaine Gentlemen, being Lords of seuen tithings in "Blackmoore...grew desirous to" [rework the mines]; "and so vpon suit "made to *Edmond* Earle of *Cornwal*, sonne to *Richard* king of the *Romans*, "they obtayned from him a Charter, with sundrie Priuileges,...in consider- "ation whereof, the sayd Lords accorded to pay the Earle a halfpeny for "euery pound of Tynne which should be wrought, and that for better "answering this taxe, the sayd Tynne should bee brought to certayne places "purposely appointed, and there peized, coyned, and kept until the Earle's "due were satisfied." CAREW, *Survey of Cornwall*, f. 16.

Until the reign of James I, the same rate—or; speaking more accurately, the rate of four shillings Stg. for one hundred Pounds *Avoir.*—was maintained (MACLEAN, *Journal of the Royal Institution of Cornwall*, iv, (1873), p. 188); but from (1686) the time of James II.,(*a*) *Merchant's* was contradistinguished from *Stannary* (presumably one hundred and twenty lbs. Avoir., to the hundred-) weight. (PEARCE, *Laws and Customs of the Stannaries*, p. 66).

Meanwhile the Duties in Devon were levied at the rate of one shilling and sixpence three farthings per one hundred and twelve (*Avoir.*) lbs.

It may not be difficult to offer a probable conjecture regarding the different rates of Duty levied in the two Counties. "In 1314—1315 the

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(*a.*) On the 12th of June 1688 [two days after the birth of the Prince of Wales, and three days after the seven Bishops had been imprisoned] John Lord Bellasis, and other Commissioners of the Treasury, on behalf of King James II, granted to John Earl of Bath, Lord Warden of the Stannaries, and others his partners "the sole Privilege of making Pence, "Half-pence and Farthings of Tin, to pass throughout all his Majesty's Dominions, free of "all Customs and other Duties whatsoever...."

PEARCE, *Laws and Customs of the Stannaries*, p. 91.

but, on the whole, they have failed to realize expectations founded on so rich a deposit at the surface.

"people of Cornwall complain...that Antonyn de Pisane and his merchants, "to whom the king (Edward II.) had granted pre-emption of tin in Cornwall "...weighed it with unlawful weights, and gave no more than forty two "shillings per thousand weight for the tin which they sold for six marks "(Four Pounds Stg.); and that the number of working tinners in Cornwall "was consequently reduced from 3000 to 500." SMIRKE, *Case of Vice against Thomas*, p. 18.

From 1291 to 1302 "the number of white tinners, *i.e.*, of persons employed in Devonshire in smelting tin, &c., and of black tinners employed in mining and producing black tin" (tin-ore)—

White-tinners.	*Black tinners.*
varied from 86 to 302, and averaged 180;	varied from 199 to 473, and averaged 370. *Ibid*, p. 44.

"The times of Coynage come twise in the yeere, *viz.*, about Midsummer "and Michalmas; but because it falleth out verie often, that the Tynne "which is wrought, cannot be blowen and brought thither against the limited "dayes, there are, in favor of the Tynners, certaine later times assigned, "which they term Post-coynages." CAREW, *Survey of Cornwall*, f. 13.

"For the indulgence of Coining at Christmas and Lady-day the owners "pay four pence per hundred on stamping, or what is called *post-groats*, "which are generally farmed out every thirty-one years." GILBERT, (C. S.), *Historical Survey of Cornwall*, i, p. 245.

The *post-groats* were farmed by descendants of a former Surveyor-General of the Duchy until 1838, when—like the other imposts—they were abolished by Parliament.

Moreover, at every Coinage, other—though smaller—charges, known as *Fees* and *Great-pieces*, were also made. Of these the last, at least, was probably of very early origin, for "*the account of Thomas de Ocham, receiver, "during the shrievalty of Thomas de la Hide, steward and sheriff of Cornwall, "in the time of Earl Edmund*, 25 Ed. I [A.D. 1296—1297,]" mentions "in "240 grossis peciis removendis de aula in curiam, 5s." SMIRKE, *Case of Vice against Thomas*, p. 45.

The Assay was made—as usual in Smelting-houses—by cutting partly and then breaking off a small piece from a lower corner of each block; the toughness and the fracture sufficiently indicating the quality. By prescriptive right the Assay-Master claimed the severed portions as his perquisite; but they were always returned to the Tinner on payment of four pence a *(Coin)* piece to the officer; who, in fact, received no other remuneration, until the Coinages were rearranged in 1835; but from that time forward he, like the other officers, was paid a fixed salary from the Duchy.

Each *(piece)* block of tin assayed and weighed at the Coinage was imprinted with "the Duchy arms, viz., argent, a lion rampant, gules, "crowned or, within a border sable, garnished with bezants, which arms "were first used by Richard, King of the Romans, and Earl of Cornwall." GILBERT, (C. S.), *Historical Survey of Cornwall*, i, p. 246.

When the Duties and other charges on the Coinage of tin were abolished by Parliament in 1838, the Duchy was compensated with an annuity calculated on the income of ten immediately previous years which averaged **£16,216. 5s. 1½d.**

Gold has been found mixed with *stream-tin-ore* in Kenwyn,*† Ladock,‡ Probus,* Creed,* Saint Ewe,* Saint Mewan,* Gorran,§ Saint Stephen's, Saint Austell,‖¶** Lanlivery,†† and Lostwithiel;‡‡ but the entire produce of the County can scarcely have exceeded a few lbs. As, however, no single mass, yet discovered, has weighed an ounce,§§ as the specimens have rarely exceeded a penny-weight, as many weigh but a few grains each, and as still greater numbers are even smaller, there may be ground for suspicion that no considerable extent of *tin-ground* is absolutely destitute of gold,‖‖ but that much has escaped notice from the smallness of the particles and the inexperience of the workmen.

Masses of *Jew's-house tin*¶¶ have been discovered in several

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* Borlase, *Natural History*, p. 214.

† Michell, *Manual of Mineralogy*, p. 2.

‡ Hawkins (Sir Christopher), *Cornwall Geol: Trans*: i, p. 235.

§ Captain James Knight, Superintendent of the *Stream-work*, MS.

‖ Klaproth, *Mineralogical Observations*, p. 12.

¶ Petherick (W.) and Martin, *Journal of the Royal Institution of Cornwall*, iii (No. xi.) p. xiii.

** Forbes (David), *London, Edinburgh, and Dublin Phil*: *Mag*: xxxvii, (1869), 323.

†† *Ante*, p. 215, 216.

‡‡ Borlase, *Journal of the Royal Institution of Cornwall*, i, (No. iv.) Supplement, p. 35.

§§ "The largest piece [of gold] found in Cornwall...is that in the possession of William Lemon, Esq., of Carclew, which weighs in gold-coin three pounds and three shillings, or fifteen pennyweights and sixteen grains...It appears to have come from a vein half an inch wide at a medium. On each side it has a light-brown, fatty earth, which is the only impurity it is mixed with. It was found in the parish of Creed, near the borough of Granpont." Borlase, *Natural History*, p. 214.

‖‖ "Mr. Rosewarne [one of the principal tin-smelters in Cornwall] suspects, as he informs me, that there is gold, more or less, in all stream-tin in the County." *Ibid*, p. 214.

¶¶ "In the stream-works in St. Stephen's Branel, they find now and then some small lumps of melted tin, two inches square and under:...this kind cuts with difficulty, and more harsh and gritty than the common melted tin...These fragments I look upon as fragments...scattered from the Jewish melting-houses." Borlase, *Natural History*, p. 163.

"In May 1765 was found near St. Austle by some streamers, a large cake of Tin-ore, weighing about six pounds, irregular in shape,...lying about 5 feet under the surface, and in the middle of that Stratum of Tin-ore so remarkably spread in the Moor adjoining to the forementioned town.

parts of the district; but most frequently, though not always,* towards its southern boundary; there is, however, reason to believe that such discoveries have been of late much less numerous

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"When the lump was broke it appeared to consist of two incrustations sur-"rounding the whole, and a Nucleus or central substance of crystal intermixed "with the purest malleable tin. The outmost crust was about the 8th of an "inch thick at a medium, and of a brownish straw-colour; the 2nd incrustation "was more blackish in colour, closer grain'd with some faintish appearances "of whitish specks interspersed, about one third of an inch thick; these "two incrustations...inclosed a third substance, consisting of laminated crys-"tals, rising side by side out of an edging shining like melted tin, which "lies as it were at their roots coherent to the 2nd incrustation; the Laminæ "of crystal...being shot in a great variety of directions intersect each other, "and leave a vast number of cells, within which are plainly seen, and may "be freely cut with a knife, many specks and granules of perfect native tin." Borlase, *Journal of the Royal Institution of Cornwall*, i, (No. iv.) Supplement, p. 25.

"On...the 27th of July '65 was found in a Stream-work near the borough "of Granpont,...another lump of the same kind of Tin-ore as the former, "as to its crust and covering; its weight was between eleven and twelve "pounds; the pure tin was not in granules as in y^e^ first Specimen, nor thin "as a leaf as in No. 2, but much more abundant, and in some places more "than one inch thick; the Metal was inclos'd so securely, that but for the "extraordinary weight it had pass'd unnotic'd....but whether Native, or "Tin melted by Art and inclosed by long lying in a petrifying Tin-water with "a Crust similar to that of the forementioned Specimen, I can't affirm." *Ibid*, p. 26.

Some few years ago a mass of *Jew's-house* tin, which weighed seventy five pounds, was discovered at Burngullow in St. Mewan. Its shape was rather oval, and it measured—

20. inches in length;—
11. ,, width;—
and at the middle 2·5 ,, extreme thickness; thinning, however,—almost to an edge—at the sides and ends. The discoverers took it to, and sold it at, Calenick Smelting-house near Truro, and there it still remains. Mr. Francis Michell, of Calenick, MSS.

A mass, in which small, rich, pebbles of *stream-tin-ore* and fragments of charcoal were cemented by metallic tin, was discovered, immediately below the surface, in Trethowel-wood near St. Austell. Occasional interstices between the other ingredients, were sometimes thinly encrusted with light-lemon coloured granules. Its weight was eighty pounds; and—about three years ago—it was sold to the Carvedras Smelting Company (at a rate of £95 per ton,) for £3. 6s. 5d. This remarkable specimen now enriches the collection of Mr. J. C. Daubuz of Killiow near Truro. Mr. William Petherick, of Saint Austell, MSS.

* "A slab of *Jew's-house-(grain)-tin*...weighing 39½ lbs. avoirdupois "...was found on the Barton of Carnanton, Parish of Mawgan in Pydar, "two feet and a half under the surface, in swampy ground, and contiguous "to what is usually called a Jew's House." Michell (John), *Manual of Mineralogy*, p. 75. Poole, *Journal of the Royal Institution of Cornwall*, i, (No. iv.), p. 9.

than they were formerly, and that the specimens have found their way to the Smelting-house more frequently than to the Museum.

Whether the more carefully moulded blocks disinterred from the sand, gravel, and shingle of St. Austell moor,* and dredged from the bottom of Falmouth harbour,† are to be classed with more rudely shaped,—and perhaps more deeply oxidized‡—masses, seems an Antiquarian, rather than a Geological, enquiry.

In the *stream-works* of St. Austell and Lanlivery. .about 25,—and
„ „ the Tregoss-moors ..... „ 10
men and boys now (1873) find employment.

"About [the year 1772] a slab of tin weighing about 20 lbs., was found "in the Goss-moors in Roche, which from its appearance seemed to be very "ancient. It was found, about four feet below the surface, by some tinners "who were searching for ore. It was about three inches thick and its width "and length were in proportion. In colour it bore a strong resemblance to "lead; but on examination it was found to be very deficient in purity, its real "metal when separated from the dross not amounting to more than 13 lbs. "A singular kind of ancient shovel was also found at the same time and "place." HITCHINS AND DREW, *History of Cornwall*, ii, p. 587.

"In the parish of Withiel there exists the remains of a Jew's-House— "to use its popular designation—formerly used [for smelting tin-ore] on a "farm called Landjew." *Gentleman's Magazine*, xcvi, (1826), p. 125.

* "In one of the [stream-works on the St. Austel moor] were lately "found, about eight feet under the surface, two slabs, or small blocks of "melted tin, of about twenty-eight pounds each, of a shape very different "from that which for many years has obtained in Cornwall... They have "semicircular handles or loops to them, as if to sling and carry them more "conveniently on horseback; they are much corroded by the sharp waters "in which they have layn, a kind of rust or scurf-like incrustation enclosing "the tin." BORLASE, *Natural History*, p. 163, *Pl.* xx, *Fig.* 19.

† "The form of the block of tin which was dredged up in Falmouth "harbour....about forty years ago and presented by the late Thomas Daniell, "Esq., of Truro, to the Museum of the *Royal Institution of Cornwall*....is "that of an *astragalus*, or knuckle-bone...It is 2 feet 11 inches long, 11 "inches wide, and 3 inches thick at the centre, perfectly flat on one side, "but curved on the other, and having four prolongations at the corners, "each 1 foot long. It is said by Diodorus that the inhabitants of Belerium "(the most western part of Cornwall) cast the tin into the form of '*astragali*.' "....The weight, about 130 lbs., is just the proper weight for a horse having "to carry two of them on a pack-saddle." JAMES, *Report of the Royal Institution of Cornwall*, xlv (1862), pp. 29, 32, 33, *Pl.* iii.

"The block in the form of an *astragalus*, found near St. Mawes, at the "entrance to Falmouth harbour, marked with a symbol, a small *astragalus* "....weighs 158 lbs. avoirdupois." POOLE, *Journal of the Royal Institution of Cornwall*, i, (No. iv), p. 9.

‡ Michell, (J.), *Manual of Mineralogy*, p. 74. Collins, *Journal of the Royal Institution of Cornwall*, iii, (No. xiii), p. 84. Napier, *Ibid*, p. 84. Percy, (Dr., F.R.S.), MS.

The eastern district is bounded by the Fowey and the Camel and certain of their tributaries on one side, and by Devonshire on the other. It comprehends the great granitic range—the most elevated part of Cornwall*—which extends from the vicinity of Cardinham-bury on the south-west beyond Brea in Alternun on the north-east, and from Greylake near Camelford on the north-west to Stanton in Saint Cleer on the south-east,† beside smaller bodies of similar character at Kit-Hill,* and at Gunnis Lake on the Tamar;†—slate—possibly of more than one period‡—usually mantles round the granite, of which, however, veins and beds§ either intersect or—less frequently—interlie the planes of cleavage; but in one instance at least a considerable tract of slate—probably of no great thickness‖—is entirely surrounded by granite;—felspathic and quartzose porphyries *(elvans)* form broad

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* Kit Hill rises ..... 1,067 feet above the sea;—
Caradon ..... 1,208 ,, ,, ;—
Kilmar ..... 1,277 ,, ,, ;—
Rough Tor ..... 1,296 ,, ,, ;—
Brown Willy ..... 1,368 ,, ,, .

Maclauchlan, (De la Beche's) *Survey*, pp. 14, 17, 18.

† Boase, *Cornwall Geol*: *Trans*: iv, pp. 173, 210, 221. De la Beche, *Report*, pp. 159, 161. Sedgwick and Murchison, *Geol*: *Trans*: v, p. 685. Whitley, *Report of the Royal Institution of Cornwall*, xxxii, (1850), p. 31. Holl, *Quarterly Journal of the Geological Society*, xxiv, p. 440. Henwood, *Cornwall Geol*: *Trans*: v, p. 131; viii, pp. 655-660.

‡ Berger, *Geol*: *Trans*: i, p. 123. Mohs, *Thomson's Annals of Philosophy*, xiii, p. 311. Conybeare, (J. J.), *Geol*: *Trans*: iv, p. 424; *Annals of Philosophy*, (N.S.), iv, p. 401; v, p. 185; vi, p. 37. Boase, *Cornwall Geol*: *Trans*: iv, pp. 382-398. De la Beche, *Report*, pp. 56-58, 61-63, 79-81. Phillips, (Prof.), *Palæozoic Fossils of Cornwall, Devon and West Somerset*, pp. 164-182, 195-200. Sedgwick and Murchison, *Geol*: *Trans*: v, pp. 665, 668. Sedgwick, *Quarterly Journal of the Geological Society*, viii, p. 16. Henwood, *Cornwall Geol*: *Trans*: v, pp. 134-136; viii, pp. 667-673, 700-703. Holl, *Quarterly Journal of the Geol*: *Society*, xxiv, pp. 402-406, 414-426. Peach, *Cornwall Geol*: *Trans*: vi, pp. 12, 51, 181, 236, 296; vii, pp. 17, 57, 121, 125, 175. Williams, *Ibid*, vi, p. 122, 334; vii, p. 64. Couch, (J.), *Ibid*, vi, p. 139; vii, pp. 244, 249. Couch, (R. Q.), *Ibid*, vi, pp. 147, 219, 276; vii, pp. 13, 193, 273, 300, 317. Pattison, *Ibid*, vi, p. 267; vii, p. 1, 63, 109, 132, 208, 246. Murchison, *Ibid*, vi, p. 317. Giles, *Ibid*, vii, pp. 93, 155, 169. Pengelly, *Ibid*, vii, pp. 106, 115, 211, 388, 441. Whitley, *Ibid*, vii, p. 336, *Pl.* iv.

§ Webb and Geach, *History of Mining in the Caradon District*, p. 67. Henwood, *Cornwall Geol: Trans:* viii, pp. 656-660.

‖ *Ordnance Geological Map*, Sheet xxv. Whitley, *Geological Map of the Caradon Mining District*. Henwood, *Cornwall Geol*: *Trans*: viii, p. 657.

dykes *(courses)* which traverse both granite and slate,* and occur also in isolated masses, but these are peculiar to the granite;—and bodies of felspathic and hornblendic rocks sometimes sever, sometimes interstratify,† the slate.

The granite, slate, elvan, and hornblendic rocks are all traversed by the *lodes;* but on opposite sides of these the strata do not always occupy co-incident positions;‡ and the rocks as well as the *lodes* are traversed by *cross-veins.*§ The *lodes* which yield ores of tin and copper usually bear a few degrees north of east and south of west,‖ and the *cross-veins* (which are rarely productive at the intersections) range from north or north-west to south or south-east;¶ but where ores of lead and silver prevail the productive series usually takes a nearly meridianal direction,** whilst the unproductive veins cross them.†† Both *lodes* and *cross-veins,* generally speaking—though with many exceptional cases—dip towards the nearest body of granite.‡‡

Tin-ore occurs in *lodes* which traverse§§—

—the slate at Saint Neot, Saint Cleer, Linkinhorne, South Hill, and Calstock;—and

—the granite at Saint Cleer, Linkinhorne, Alternun, and South Hill.

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* Boase, *Cornwall Geol: Trans:* iv, p. 210. De la Beche, *Report,* pp. 180, 183. Giles, *Cornwall Geol: Trans:* vii, p. 201. Whitley, *Geological Map of the Caradon Mining District.* Holl, *Quarterly Journal of the Geological Society,* xxiv, pp. 415, 441. Henwood, *Cornwall Geol: Trans:* viii, p. 670.

† Rogers, (Canon), *Cornwall Geol: Trans:* ii, p. 218. Boase, *Ibid,* iv, pp. 208, 220. De la Beche, *Report,* p. 79. Holl, *Quarterly Journal of the Geological Society,* xxiv; pp. 421, 444. Giles, *Cornwall Geol: Trans:* vii, p. 205. Henwood, *Ibid,* viii, pp. 661, 701.

‡ Henwood, *Cornwall Geol: Trans:* viii, pp. 656-660.

§ *Ibid,* viii, pp. 685, 714.

‖ *Ibid,* viii, pp. 674, 704.

¶ *Ibid,* viii, pp. 681, 715.

** *Ibid,* viii, p. 704.

†† *Ibid,* viii, p. 715.

‡‡ *Ibid,* viii, p. 675, 682.

§§ Copper and many of its ores are found
in slate at Saint Neot, Saint Cleer, Linkinhorne, South Hill, and Calstock;—
in granite at Saint Cleer, Linkinhorne, and Calstock.

Lead-ore is associated with silver
in slate at Saint Pinnock, Menheniot, Saint Ive, South Hill, and Calstock.

Native silver, and several ores of silver have been obtained
in slate at Saint Pinnock, Saint Ive, and Calstock.

At *Lark-holes** near Redgate tin-ore is scattered in isolated masses, and at *Gonamena*† on the south-western slope of Caradon as well as at Kit Hill,‡ it is disseminated, through the granite.

Notwithstanding every part of the waste between Powne's-cost and Five-lanes has been furrowed in search of *stream*-tin-ore, the miner has found no encouragement there or in the neighbourhood§; for, at present the entire tract and the (Drains and the Saint Neot) tributaries of the Fowey—which rise in it—scarcely afford a livelihood to thirty workmen.

At *Netherton*, in Saint Neot, operations have been lately resumed on a—previously wrought yet unexhausted—spot, beside the Drains river. The present works have not yet reached the sides of the ancient opening; and the vegetable mould, the more recent granitic sand and gravel, the peat, and the small angular, subangular, and rounded masses of granite, as well as the ingredients associated with them, were all indiscriminately mixed by the earlier workmen; neither the works nor the matter extracted from them affords, therefore, available clue to the natural succession of the several deposits. The small quantity of *tin-ground* still remaining is covered by large blocks‖ of hard granite; and it cannot be extracted until they have been removed. The *Shelf*—everywhere more or less disintegrated—consists of rather coarse-grained granite; in which eroded pits—beneath hard, *travelled* rocks, especially,—contain quantities of rich *stream*-tin-ore.

At *Penny-snap, (Wheal Prosper)* in Alternun, a *stream-work*, immediately east of the Drains river, has laid open—

(1). Peat¶ ..... 7 feet;—

(2). Angular, subangular, and rude spheroidal, masses of granite, schorl-rocks, and quartz; varying from the size of fine sand, to many inches in length, breadth, and thickness, all imbedded in pale blue felspathic clay; from 3 to 6 feet, and averaging about..... 5 ,, ;—

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* Mr. John Taylor, Purser of *Craddock Moor*, MS.

† Henwood, *Cornwall Geol*: *Trans*: viii, p. 664.

‡ *Ibid*, v, p. 132.

§ The *Ordnance Geological Map* (Sheets xxv and xxx, coloured by Sir H. T. De la Beche in 1839) indicates no *lode*—though one at least has been since discovered—north of the, now nearly exhausted, deposit of *stream*-tin-ore long wrought on the Bodmin moors.

‖ Henwood, *Cornwall Geol: Trans:* iv, p. 61; *Ante*, p. 194.

¶ Of this, valuable fuel, little or no use is made in the neighbourhood.

(3). The *tin-ground* generally consists of much the same ingredients as the deposit (2) directly above it; but perhaps it may sometimes affect smaller and more rounded masses.* The tin-ore occurs, mostly, as water-worn sand or gravel; but now and then in perfect (unfractured) crystals ..... 3 „ ;—

The *Shelf* is rather coarse-grained granite; moderately hard whilst covered, but it rapidly disintegrates when—in progress of the work—it is exposed.

The pits are drained by aid of water-wheels; respectively—

6 feet in diameter, and 3 feet wide *(in breast)* at *Netherton;* and
7 „ „ „ 1·5 foot „ „ „ *Penny-snap.*

Trewint-Marsh, also in Alternun, drains into a brook which feeds the Lynher, a tributary of the Tamar. At and near its head, operations have been long discontinued; but an instructive section is still visible. The *tin-ground* was long since gleaned of any ore it might have contained; but the remaining portions of it, and the whole succeeding deposit—both, consisting of granite, schorl, quartz, and felspar, beside fragments of various granitic *vein-stones*—affect, here and there, rude spheroids, and, perhaps more frequently, subangular masses; but for the most part they are rough angular blocks, which bear no mark of attrition.

The moors west of Kilmar, Sharp Tor and the Cheese-wring decline towards Trewartha-marsh, whence their drainage falls into the Lynher. The bed and margin of every tributary† evidence the labours of earlier *streamers,* who sometimes found particles of gold mixed with their tin-ore.‡

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* "The stream-works in the valley of the Fowey, on the Bodmin moors "...show that twice has the surface been clothed with vegetation. The first "time, on a granitic soil, grew large timber trees: a flood laid them down... "with their heads directed down the valley...and spread a layer of granite "pebbles and tin over them: another soil was formed supporting a vegeta-"tion of bushes and ferns, the resort of the deer, and upon this a finer gravel, "the result of slower and longer diluvial action, accumulated: and lastly, "on this, a third bed of peat has arisen, crowned with no leafy honours, and "whose tallest plant is the low but elegant heath." PATTISON, *Cornwall Geol: Trans:* vii, p. 36.

† Blight, *Journal of the Royal Institution of Cornwall,* iii, (No. ix,) . 13.

‡ Three-quarters of an ounce of gold culled from amongst the *stream*-tin-ore of his domain in North Hill, was—by direction of Mr. Spoure (who died in 1696)—made into a signet-ring, which has descended, as an heir-loom, to his representative Mr. Rodd of Trebartha, whose muniments comprise a contemporary manuscript descriptive of the conditions under which both the metal and the ore were discovered. MR. EDWARD HEARLE RODD, of Penzance, MS.

As the earlier accounts show that tin was obtained in this district and in its neighbourhood in much larger quantities than in any other part of Cornwall,* it might have been expected that traces of works still more ancient would have been more numerous, and masses of *Jew's-house-tin* more frequently found. If it were so, however, they probably found their way to the Smelting-furnace at once; for the interest of Antiquaries and Mineralogists in their preservation was, at that time, but slightly aroused. As, for many years past, *tin-streaming* has had but a bare existence in the vicinity, neither specimen, nor record of discovery,† has rewarded later enquirers.

"The present Mr. Glynne of Glynne has...shown me a large gold "Seal-ring made of Gold hoppes found in the River under his house" [Mr. Tonkin's papers MS. B: pa: 54]. "I have also Two small pieces found in a "Stream-work near the Church of Cardynham not far from Bodman." Borlase (Additions to *Natural History*), *Journal of the Royal Institution of Cornwall*, I. (No. iv.) Supplement, p. 35.

"In a *stream-work* conducted by me on the river Camel a good bit of "gold was found mixed with the tin-ore." Captain James Knight, MS.

* Maclean, *Journal of the Royal Institution of Cornwall*, iii, p. 238.

† At Berriow in North Hill the ruins of an old building—always known as *the Jew's-house*—were removed about 1832-3, and beneath them were found—

a ladle of stone [? potstone] now in the Museum of the Royal Institution of Cornwall; and two troughs or moulds of granite, which measured respectively—

	The smaller.		*The Larger.*	
Length	Top	16· inches	.....	24 inches.
,,	Bottom	12· ,,	.....	18 ,,
Width	Top	11· ,,	.....	14 ,,
,,	Bottom	7·5 ,,	.....	9 ,,
Depth	.....	5· ,,	.....	7 ,,

Their capacities, therefore, were about } 647·5 cubic inches..... 1690 cubic inches;

and masses of tin of these respective dimensions would have weighed some } 173lbs. Avoir. ..... 445lbs. Avoir. each.

That is to say one would have been an ample *half-load* for a packhorse on a short journey;—

,, the other ,, about the weight of the heaviest blocks of tin *coined* in 1837—8.

Neither ore, fuel, slag, nor metallic tin, was found amongst the rubbish.

Rodd (F.) *Report of the Royal Institution of Cornwall*, xxxii (1850), p. 58. Abridged.

The following pages—enumerate various relations between detrital repositories of tin-ore and the water-shed of Cornwall;—show the respects in which their mineral characters either resemble or differ from, those of the *(Shelf)* rocks on which they rest, and of other strata in their several neighbourhoods;—point out the mechanical conditions of the *tin-ground* in different districts;—describe the numerous deposits between the metalliferous beds and the surface;—recapitulate their organic contents;—and mention the unequal elevations at which tin-bearing detritus has been scattered.

(I). *The water-shed of Cornwall* presents several remarkable flexures;* but—except in two instances, one of small, and other of not very considerable, extent—its range is much nearer to the north, than to the south, coast. As the velocity of streams must be proportional to the inclination of their beds, those which have the same fall within the shortest distance, must—under ordinary circumstances—flow most rapidly; whilst those which receive the drainage of the widest areas, must—under like conditions—attain the largest volumes. The small, short, shallow, and comparatively rapid brooks which fall directly into the Bristol Channel, thus possess proportionally greater degrading and transporting powers, than the longer, larger, and slower streams which flow into the English Channel. The former, therefore, deposit, on their beds and banks, very little of the disintegrated matter, which they hold in suspension; but on reaching the sea-level, and there meeting the tide, their velocity is arrested, the solids subside, and form—at the mouths of the several estuaries—sand-banks and shoals which—as at Hayle, Padstow, and intermediate creeks of less importance—materially obstruct the navigation. The Camel—the longest of our northern rivers—can scarcely be included in this category; for its direction is neither directly transverse, nor accurately parallel, to the water shed; but numerous important tributaries—flowing directly from the central range—materially modify its character. The streams which issue from the southern slope have, generally speaking, a longer and, con-

* De la Beche, *Report*, p. 19, *Fig.* 1. *Ante*, pp. 193, 195, 197, 198, 199, 201, 204, 212, 213, 215, 216, 219, 221, 225, 228, 230.

sequently, a less rapid course; and—as they receive the drainage of wider tracts—their volume is proportionally larger. In steeper parts of their progress, and where they traverse rocks in some state of disintegration, however, they erode and carry with them certain portions of the *débris;* but, where the declivity diminishes, the velocity—and with it the suspending power—of the current declines; and some, at least, of the suspended matter subsides* to the bottom or on the margin of the streams. Where the rivers fall into broad gulphs—as at the Mount's-bay and the bay of Tywardreath, or into deep inlets—as at Falmouth and Fowey, —their mouths are rarely obstructed by shallows. But the bars of sand, which to a greater or smaller extent—obstruct the entrances to all our northern creeks,† can scarcely be said to have assumed their normal forms, if, indeed, their actual positions, under action of the sea alone; for they are barely uncovered, by the ebbing tide, before the finer particles begin to drift, under the influence of even an ordinary breeze.‡ During heavy gales‡ the sands rise in clouds, and—driven far inland—irreclaimably overwhelm large tracts of country;§ of late years however, such

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* Thomas, (R.), *History of Falmouth*, p. 46.

† Borlase, *Natural History*, pp. 44-47. De Luc, *Geological Travels*, iii, pp. 178, 181, 182-3. Paris, *Cornwall Geol: Trans:* i, p.4. Boase, *Ibid*, iv, p. 260. De la Beche, *Report*, pp. 425-428. Sedgwick and Murchison, *Geol: Trans:* v, (N.S.), p. 285.

‡ "Saint Peran...too well brooketh his surname, in Sabulo: for the "light sand, carried up by the north wind, from the sea shore, daily con- "tinueth his covering, and marring the land adjoynant...draue the Inhab- "itants to remooue their Church." Carew, *Survey of Cornwall*, f. 148.

"My father has informed me that within seventy or eighty years, a field "in preparation for tillage, by some of his relatives, in Perran-zabuloe, was, "during a storm, irreclaimably covered in a single night with sand, which "had drifted to the depth of a foot." Henwood, *Cornwall Geol: Trans:* v, p. 112, Note †.

§ Daily observations on the winds which prevailed at Penzance during twenty-one years (1807-1827) show their annual average directions to have been—

N.	50 days.	S.	41 days.
N.E.	72 ,,	S.W.	117 ,,
E.	45 ,,	W.	123 ,,
S.E.	57 ,,	N.W.	146 ,,

Giddy, (E. C.), *Phil: Mag: and Annals*, iii, (1828), p. 179.

disastrous consequences have been materially arrested, by planting the sand-hills with the sea-rush, *(Arundo arenaria.)**

(II). *The mineral characters of the tin-ground,—of the (Shelf) rock, on which it rests,— and of the strata adjoining the Shelf,* in various parts of Cornwall, are compared in *Table I.*

(*a*). *The earthy portions of the tin-ground.* It seems that where —as in the moors of Towednack,† Wendron,‡ Saint Austell,§ Luxulion,‖ and Alternun¶—the *tin-ground* lies far within the boundary of its native series, the earthy ingredients of the one so closely resemble the general characters of the other as to forbid absolute identification of the rocks and veins from which the *detritus* had been reft. Even where the *tin-ground* occurs near the junctions of different systems—as in the swamps of Saint Austell,§ Luxulion,‖ and Saint Columb-major,**—the *débris* of the stratum immediately beneath always prevails; sometimes, indeed, to, all but, an entire exclusion of the other.†† Generally speaking, however, the fragments are intimately mixed; but, perhaps, not always in the same proportions. This, however, is not always the case; for at Carnon the upper and the lower parts sometimes differ in mineral character.‡‡

(*b*). *The metallic ingredients of the tin-ground* comprehend several of the more plentiful ores; viz :—blende,§§ copper in the

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* Paris, *Guide to the Mount's-bay*, p. 162. Henwood, *Cornwall Geol: Trans:* v, p. 113.

† *Ante*, p. 196.

‡ *Ante*, pp. 200-201.

§ *Ante*, pp. 213-214.

‖ *Ante*, pp. 215-216.

¶ *Ante*, p. 230.

** *Ante*, pp. 217-218.

†† "Le gîte exploitable près Pentovan...renferme des fragmens plus ou "moins volumineux...de toutes les roches et de toutes les gangues qui se "trouvent dans la contrée environnante, mais cependant à l'exception du "granite." Heron de Villefosse, *Richesse Minérale*, ii, p. 354.

‡‡ "The bottom [of the *tin-ground*] has sometimes a different quality "of waste associated with it as if deposited at a different period." Taylor, (C. Dyke), *Proceedings of the Institution of Mechanical Engineers*, (Cornwall Meeting), p. 161.

§§ Henwood, *Cornwall Geol*: *Trans*: iv, p. 66.

state of pyrites* only, and more than one compound of iron ;† but all in much smaller quantities and less frequently than in the *lodes*. Indeed the proportion of tin-ore in the *tin*-ground of one of the largest and richest stream-works in Cornwall‡ scarcely exceeded that contained in vein-stones of the very poorest *lodes* when culled and made ready for the stamping-mill.§ Whether substances with which the tin-ore was associated in the *lodes* were separated from it whilst passing from its original, to its latest, repositories, or that the lighter and more soluble impurities were afterwards removed, in suspension or solution, by the streams, of spring and rain water, percolating through the *tin-ground*, is scarcely within compass of this enquiry ;‖ but that the *(grain-tin)* metal obtained from *stream*-ore is of better quality than the metal afforded by mine-ore has been long and generally known.¶

(*b*–1). *Gold has been culled from amongst the detritus of every tin-producing district in Cornwall ; viz :*—at Saint Just,** Wendron,††

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* Colenso, *Ibid*, p. 31.

"Native copper is frequently found in our mines, near the surface, or "commonly but a few fathoms deep." Pryce, *Mineralogia Cornubiensis*, p. 61.

† Colenso, *Cornwall Geol*: *Trans*: iv, p. 31. Henwood, *Ibid*, p. 59.

‡ "The quantity of tin-ground opened at Pentuan has been seven ' hundred fathoms in length, averaging about twenty six fathoms in breadth, "making a total of eighteen thousand two hundred square fathoms. The "average quantity of black-tin [ore] gotten per square fathom has been one "hundred and eighty pounds" [or about 0·00500 its weight.] Colenso, *Cornwall Geol*: *Trans*: iv, p. 32, Note.

In Banca "the quantity [of ground] worked over per man yearly, on an "average from 10,000 to 16,000 cubic feet, must contain 19 to 20 cwt. [from "0·00076 to 0·00128 its weight] of tin-ore." Van Diest, *Banca and its Tin Stream-works*, (Translated by Clement Le Neve Foster, B.A., D.S., F.G.S.) p. 84.

§ *Quarterly Journal of Science*, iii, (1866,) p. 108. Henwood, *Cornwall Geol*: *Trans*: viii, p. 472.

The proportion of tin-ore obtained from the *tin-ground* at Carnon varies from 0·150 to 0·001 the weight of the mass. Taylor, (C. Dyke), *Proceedings of the Institution of Mechanical Engineers*, (Cornwall Meeting), p. 161.

‖ "The metalliferous substances obtained from washings, are such as "are not liable to undergo decomposition when exposed to air and moisture." Whitney, *Metallic Wealth of the United States*, p. 200.

¶ Carne, *Cornwall Geol*: *Trans*: ii, p. 332. Henwood, *Ibid*, iv, p. 65.

** Carne, *Cornwall Geol*: *Trans*: ii, pp. 293, 300.

†† Henwood, *Ante*, p. 201, Note‡.

Perran-ar-worthal,* Feock,† Kenwyn,† Ladock,‡ Probus,§ Creed,§ Gorran,‖ Saint Ewe,¶ Saint Austell,** Saint Stephens, Luxulion,†† Lostwithiel,‡‡ Saint Columb-minor,§§ Cardinham,‖‖ and North Hill;¶¶ but so sparingly that it bears no assignable proportion to the other ingredients.

Of the specimens hitherto discovered, the fragments of one amounted to an ounce*** *(Troy)*, another has weighed nearly (0·7 oz.) sixteen,††† a third (0·6 oz.) more than eleven*** penny weights, and many other have been as large as pease. Much of the gold has occurred in small—and sometimes rounded—*nuggets*, thin flakes, and slender threads; but the greater part is in crystalline granules‡‡‡ and in dust.*** Detrital gold is, in quality, as superior

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* Francis, (W.), *Gwennap; a Descriptive Poem*, p. 94. *Ante*, p. 205.

† Michell, (J.), *Manual of Mineralogy*, p. 2. Henwood, *Cornwall Geol: Trans*: iv, p. 66. *Ante*, p. 205.

‡ Hawkins, (Sir C.), *Cornwall Geol: Trans*: i, p. 235.

§ Borlase, *Natural History*, p. 214. *Ante* p. 225.

‖ Captain James Knight, of Menadue in Luxulion, MS.

¶ Borlase, *Natural History*, p. 214; *Journal of the Royal Institution of Cornwall* i, (No iv), Supplement, p. 35.

** "Stream-tin from Pensagillis is remarkable on account of the native gold, which now and then is met with in it, and found, though very rare, in pieces of the value of two or three pounds sterling." KLAPROTH, *Mineralogical Observations*, p. 12.

Petherick and Martyn, *London, Edin: and Dublin Phil: Mag*: xxxv, (1869), p. 323.

†† Maton, *Observations on the Western Counties*, i, p. 175. Henwood, *Ante*, p. 215.

‡‡ "In the Bayliff of Blackmoor, a M.S. in my possession, written by "one Mr. Beare, in Queen Elizabeth's time, there is an account of a Gentle- "man who at a wash of tin at Castle Park near Lostwithiel, took up out of "the heap of tin certain fine corns, *hops*, or grains of Gold which they "call Rux." PRYCE, *Mineralogia Cornubiensis*, p. 52.

§§ Mr. John Nicholls, of Trekenning, Saint Columb, MS.; *Ante*, p. 220.

‖‖ Borlase, *Journal of the Royal Institution of Cornwall*, i, (No. iv), Supplement, p. 35.

¶¶ MS. of the late Mr. Spoure, with which I am favoured by Mr. Rodd of Trebartha, and Mr. Edward Hearle Rodd of Penzance. *Ante*, p. 231, *Note*‡.

*** Borlase, *Natural History*, p. 214.

††† Michell, *Manual of Mineralogy*, p. 2; *Ante*, p. 205; *Note*‡.

‡‡‡ Taylor, (C. Dyke), *Proceedings of the Institution of Mechanical Engineers*, (Cornwall Meeting), p. 162.

to mine-gold, as the tin extracted from *stream*-ore is to that obtained from the *lodes*, of their respective countries.* Gold

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* At Ballinvalley in Wicklow gold and tin-ore were "dispersed through "a kind of stratum composed of clay, sand, gravel, and fragments of rock, "and covered by soil, which sometimes attained a depth of from twenty "to fifty feet....The native gold occurred in massy lumps, and in smaller "pieces, down to the minutest grain. One piece weighed twenty-one ounces, "another eighteen, a third nine, and a fourth seven." It is believed that from 1796 to 1862 more than one thousand eight hundred ounces were collected....The analysis of some small grains gave

Gold	92·320
Silver	6·170
Iron	0·780

"From a small quantity [certainly not more than 150 lbs.] of sand 3½ "lbs. [0·023 its weight] of stream-tin were obtained....some fragments "presenting the peculiar appearance to which the name of *wood-tin* has been "given." Weaver, *Geol: Trans:* v, pp. 209-213. Mallet, *Journal of the Geological Society of Dublin*, iv, pp. 270-276. Henwood, *Cornwall Geol: Trans:* viii, pp. 627-634. (Abridged).

"Dans toutes les vallées des hautes chaines d'Eybenstock, on trouve une "grande quantité de galets, qui, amassés sur 3, 5 toises [19·18 to 31·97 feet] "et plus de hauteur, s'etendent à plusieurs milliers de toises de longueur. "En beaucoup de lieux, ils n'occupent pas seulement les bas-fonds; mais ils "reposent encore sur les pents des même chaînes....Ces galets sont formés "de roches granitiques et schisteuses, analogues à celles des monts environ-"nans; ils sont plus ou moins arrondis; ils ont un volume d'une ligne à "un pied, et quelquefois même trois pieds de diamètre; ils reposent ordin-"airement dans un sable à grains fins de quarz, et sont particulièrement "riches en étain. Les galets de granite tiennent le plus souvent ce métal "en filons; ceux de schorl-schiste, qui sont très abondans, en sont tous "imprégnés. On trouve, en outre, des galets de minerai d'étain massif, et "des cristaux désunis de 2 à 4 lignes [0·17 to 0·35 inch] de diamétre, épars "dans le sable. Quelques galets contiennent encore de oxidé, de la tourmaline, "et Charpentier dit qu' on y a trouvé de l'opale et quelques petites lamelles "d'or." Manes, *Annales des Mines*, ix, (1824), p. 653.

"Il y a en moyenne dans l'or du Rhin
93·400 d'or,
6·600 d'argent,
et, après l'analyse de M. Doebereiner 0·007 de platine."
Daubree, *Annales des Mines*, 4me Série, x, p. 22.

"On croit généralement dans l'Oural et á Saint Pètersbourg que l'or des "sables est ordinairement plus riche en or que celui des filons." *Annales des Mines*, 3me Série, v, p. 169.

"The detrital gold of Brazil—like the *stream*-tin-ore of Cornwall—is "always of better quality, and it invariably fetches a higher price, than the "mine-gold of the same neighbourhood."
Henwood, *Cornwall Geol*: *Trans*: viii, p. 359.

"In Bolivia I have found that the gold is purer in proportion as it is "further from its source." Forbes, (D.), *London, Edin: and Dublin Phil: Mag:* (4th Series) xxix, p. 133.

from one of the *stream*-works in the Saint Austell moors contained

Gold	90·12
Silver	9·05
Silica with sesqui-oxide of iron	0·83
	100· *

Notwithstanding the occurrence of gold in every part of Cornwall which has afforded *stream*-tin-ore, the quantities discovered have been so small that the entire produce of the county has, probably, amounted to no more than a few pounds weight;† and,

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In New Granada detrital-gold and mine-gold afforded respectively—
Detrital-gold..... 90·700 gold..... 9·300 silver;—
Mine „ ..... 83·100 „ ..... 16·900 „

Boussingault, *Annales des Mines*, 3me Série, i, p. 446.

"The Mexican tin is extracted by means of washing, from the alluvious "lands of Guanaxuato, San Felipe, Robledal, and San Miguel el Grande, "as well as in the intendancy of Zacatecas.. .One of the [tin] ores most "common in Mexico is the *wood-tin* of English mineralogists." Humboldt, *New Spain*, (Translated by John Black), iii, p. 296.

"In Australia tin-ore was first recognized, amongst the black sands "brought from the gold-fields, by Mr. George Foord, on the 11th March, "1853. Stream-tin is found in the Beechworth district, in the tributaries "of the Lenderderg, at Gympie, in the tributaries of the Yarra, in the bed "of the Thomson, and in many feeders of the Latrobe; [as well as] in "the Strathbogie ranges,..and at Taradale....The wash dirt varies in "thickness from a few inches to six feet. On the slate rock gold alone is "sought for, but on the granite bottom tin-ore is also found. Previously to "1868 the export of black sand and tin-ore had been 2,650·7 tons;—
„ tin ..... „ 5·5 „ .

Smyth, (R. B.), *The Gold-fields and Mineral districts of Victoria*, pp. 42, 131, 412, 413.

"On the borders of the granite near Cape Raja, in the province of "Soengei-Liat..gold is found in the sand on the sea shore. The gold is "found there with tin-ore, and it occurs in the same way at the top of various "small valleys, in the provinces of Blinjoe and Djeboes." Van Diest, *Banca and its Tin Stream-works*, (Translated by Clement Le Neve Foster, B.A., D.S., F.G.S.), p. 64. Note

* Forbes, (D.), *London, Edin*: *and Dublin Phil*: *Mag*: xxxvii, (1869), p. 323.

† "Native gold..has in one instance been discovered in a *cross-course* "at *Huel Sparnon*, and also in the *gossan* of *Nangiles* in Kea." Garby, *Cornwall Geol*: *Trans*: vii, p. 90.

"From a portion of a quartz-vein at Davidstowe I obtained, in 1852, a "trace of gold, and reported the fact to the Geological Society of Cornwall "...Recent experiments on the gossaniferous quartz from this locality, have "shown that it is not merely auriferous, but, in some small portions at least, "highly so." Pattison, *Quarterly Journal of the Geological Society*, x, p. 248.

even of this, there is little doubt but that more has found its way to the crucible than to the cabinet.

(III). *Mechanical conditions of the tin-ground.* Every earlier writer* and all preceding details† show that the largest blocks in all these deposits bear marks of, greater or less, abrasion and attrition. In the immediate vicinity of their original localities, it is true, they are sometimes subangular or but slightly rounded,‡ but within distances comparatively short rude globular and spheroidal forms prevail. Of the more comminuted ingredients a principal portion is, perhaps at least, equally rounded; the rest comprehends angular fragments of various rocks and veins, perfect as well as fractured crystals of tin-ore; and with these any gold present is usually mixed. All interstices between the rougher components are filled with sand and clay.§

At *Levrean*‖ the *tin-ground* is divided horizontally, by—

(*a*). *False-shelf* which has extended through the entire tract wrought during five and forty years past, and yet exists in the present works. It consists of angular and subangular masses of granite, imbedded in disintegrated granitic matter; scarcely distinguishable from the *tin-ground* above and below; save that it contains but few masses of veinstone, and is destitute of ore.

Where the *tin-ground* is thus divided, by *false-shelf*, the lower is usually the richer portion.¶

(IV). *The bed which rests on the tin-ground* might scarcely have been distinguishable from the *detritus* beneath; but—that its ingredients are, perhaps, rather less abraded;—that, in one part or other of every detrital district, it contains masses of barren rock incomparably larger than any contained in other parts of the

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* *Ante*, pp. 193—192.

† *Ante*, pp. 193—232.

‡ *Ante*, pp. 197, 217, 231.

§ In one spot, at least, flints have been obtained from this part of the series. *Ante*, p. 215.

‖ Henwood, *Cornwall Geol*: *Trans*: iv, p. 62; *Ante*, p. 214.

¶ *False-Shelf* has been observed also at the *Merry-meeting*, and *Grove*, *stream-works* in Saint Austell, at Broad-water in Luxulion, at *Chyvenhall* in Paul, and, perhaps, also at *Carnon* in Feock. Henwood, *Cornwall Geol: Trans:* iv, pp. 59, 61, 62, 64. Carne, *Ibid*, p. 104.

series;*—and that it is almost, or altogether destitute of tin-ore.†

(V). *The bed succeeding that which rests on the tin-ground* presents a family likeness in neighbouring valleys; yet—even at a like depth its ingredients are not quite identical in all; indeed, different parts of the same vale—as, for example, at the sea-level and in the uplands present this (same) bed under very different aspects.

It would seem, therefore, that, after the *tin-ground* was deposited, timber sometimes flourished in the lower valleys,‡ whilst coppice and brushwood grew in and about the upland glens; and that some subsequent change in the relative levels of land and sea, affected the former,‡ without equally affecting the latter.§‖

It would also appear that the deposit of barren *débris* was—

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* Maton, *Observations on the Western Counties*, i, p. 153. Henwood, *Cornwall Geol*: *Trans*: iv, p. 61, Note; *Ante*, pp. 194, 195.

† At Pentuan an arrow head and a small chisel of some extremely hard alloy, were found lying directly on the *tin-ground*, at the bottom of an ancient shaft. Stocker, *Transactions of the Penzance Natural History Society*, ii, p. 89.

"In process of washing the diamond-yielding (*cascalho*) detritus in "Brazil, two lance-shaped arrow-heads,—one of petrosilex the other of rock-"crystal—were obtained by H. von Helmreichen." *Journal of the Royal Geographical Society*, xiv, p. 321.

‡ Colenso, *Cornwall Geol*: *Trans*: iv, p. 32. Rogers, (J. J.), *Ibid*, vii, p. 354.

§ Henwood, *Ibid*, iv, pp. 61—63; *Ante*, pp. 199, 200, 213, 219, *Table* II.

‖ "At Bovey Heathfield the lignite is overlaid by

Peat	0·5	foot thick;
Sand. Fine, white, quartzose	3·0	feet ,, ;
Clay and sand. In separate masses, but not distinctly stratified	6·	,, ,,
Clay. Very white	10·	,, ,, ;
Sandy clay. With angular and subangular stones		thickness unknown.

Nine feet below the surface of the plain we discovered a considerable number of dicotyledonous leaves in the white clay, and immediately below them lay some large roots." Pengelly, *Phil: Trans*: clii, (1862), p. 1031.

"Of the diluvial species of plants several leaves lie upon the soft white "clay, which cannot be distinguished from those of *Salix cinerea*, Linn.... "The most frequent leaf of the white clay is *Salix repens*, Linn? Entire "little leaves, beside fragments of the leaves of *Betula nana*, Linn. have "been found in the white clay. *Betula nana* is a boreal plant, which is at "home throughout the whole arctic zone; it is found also here and there "on the highland moors of Middle Europe....In the British islands it occurs "in Scotland only." Heer, *Ibid*, pp. 1080—1082.

once* or twice†—interrupted by a large formation of peat; but a settlement of the one and a growth of the other may have taken place at the same time or at short intervals; for—in one case at least‡—the peat is interlaid by finely-divided granitic matter as thin as tissue paper.

It may not be unworthy of remark that vegetable remains, of much the same kinds, occur within short (vertical) distances of the *tin-ground*, both north§ and south‖ of the water-shed.

(V). *The deep valleys which formerly opened to the sea, below high-water mark, on the south coast of Cornwall, contain alternations of mineral with vegetable matter, and of fresh-water with salt-water deposits.*¶ Of these several particulars *Table* III affords a brief comparison; from which it appears that at

CARNON.**

(1). A bed of sand and shells .. 2 feet thick;
(3). ,, ,, 3·5 ,,
— are interlaid by —
(2). A bed of silt without shells 12· feet thick;

(1). A bed of silt and shells 0·8 foot thick;
(2). ,, ,, sand and shells 2· feet thick;
(4). ,, ,, sand and shells 3·5 feet thick;
(5). ,, ,, silt and shells 12· feet thick.
— are separated by —
(3). Three separate beds of silt without shells 12· feet thick;

(1). A bed of silt without shells 6· feet thick;
(3). ,, ,, 31· ,, .
— are interlaid by —
(2). Silt; with great quantities of shells..12· feet thick;

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* Henwood, *Cornwall Geol*: *Trans*: iv, p. 63. Barratt, (De la Beche's) *Report*, p. 403.

† Henwood, *Cornwall Geol*: *Trans:* iv, p. 61.

‡ Mr. Ralfs, *Ante*, p. 213, *Note*§.

§ Henwood, *Cornwall Geol: Trans:* iv, p. 59; *Ante*, p. 205.

‖ Henwood, *Cornwall Geol: Trans:* iv, p. 59; *Ante*, pp. 199, 219.

¶ Smith, *Geol*: *Trans*: iv, (O.S.) p. 406. Rashleigh, *Cornwall Geol. Trans:* ii, p. 282. Henwood, *Ibid*, iv, (1828), p. 58. Colenso, *Ibid*, (1829), pp. 32—37.

** Henwood, *Ibid*, iv, p. 58. Taylor, *Ante*, p. 218. Whitley, *Ante*, p. 218.

PENTUAN.*

(1). A bed of sea-sand containing animal and vegetable remains..20· feet thick;
(3). ,, ,, ..0·4 foot ,,
} are separated by
(2). A bed of silt sometimes containing animal and vegetable remains ....2· feet thick;

(1). A bed of silt containing animal and vegetable remains .. 2· feet thick;
(3). ,, ,, ..10· ,, ,, .
} are separated by
(2). A bed of sea-sand containing shells .... 0·3 foot thick.

SANDRYCOCK† near PORTH.

(1). Peat.....4·1 feet thick;
(7). Peat..... 6· ,, ,, .
} are separated by
(2). Clay ..... 1·4 foot thick;
(3). Clay, containing vegetable matter, with traces of the phosphate of iron 3·8 feet thick;
(4). Sea-sand mixed with clay 3· feet thick;
(5). Sea-sand fragments of shells and of clay-slate....4· feet thick;
(6). Coarser sand, without shells 6· feet thick;

The human remains were discovered‡ at—

Carnon.....58 feet. } below the surface. .....64 feet. } below high-water ....46 feet below. } low-water.
Pentuan..20-40 ,, . } below the surface. .... 14-34 ,, . } below high-water .. { 4 ,, above. / 14 ,, below. } low-water.

Neither speculation on the causes of these alternations, of fresh-water with marine substances, and of animal with inorganic matter; nor conjecture whether the human remains at Carnon and at Pentuan may—though they are imbedded at unequal depths and in different parts of the series—have belonged to the same, or to distant periods, can—especially in the absence of a perfect skull from Carnon§—properly find place in a mere descriptive memoir.

In the shallow *stream-works* of the moorlands the upper por-

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* Smith, *Geol: Trans:* iv, (O.S.) p. 406. Colenso, *Cornwall Geol: Trans:* iv, pp. 32 –37.

† Rashleigh, *Cornwall Geol*: *Trans*: ii, p. 282.

‡ "Assuming these facts to be correct, we seem to have evidence that "Cornwall was inhabited by human beings when the earlier accumulations "of detrital matter were effected over the tin-ground."
De la Beche, *Report*, p. 407.

§ *Table* III, *Note*†.

tions consist of much the same ingredients as both the adjoining and the neighbouring rocks and vein-stones.* They commonly occur in the state of sand and gravel;—differ little, if at all, from the beds of brooks in their vicinity;—and are disposed in, almost countless, thin layers, which alternate with yet thinner *partings* of hardened clay.

(VI). *Tin-ore* (Shodes†) *sprinkled on the surface at various altitudes.* The valleys and low-grounds—although, by far, the largest and richest—are not the only repositories of detrital tin-ore; for

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* Henwood, *Cornwall Geol*: *Trans*: iv, pp. 60—64. *Ante*, pp. 195, 196, 200, 213, 214, 215, 217, 218, 230, 231.

† "Litle stones, lye both in and nere the Brookes, and vpon the "mountaynes wher the metall lyeth; theis stones they call the Shoade, "being parcel of the veyne of owre, which being dismembred from the bodye "of the Loade, are meanes to direct to the place of profite, as the smoake "directeth where the fire lurketh." Norden, *Speculi Britanniæ*, p. 12.

"To find the *Loadworkes* the first labour is employed in seeking.... "certaine Tynne-stones, lying on the face of the ground, which are termed "*Shoade*, as shed from the main *Loade*, and made somewhat smooth and "round, by the waters washing and wearing....Having found any such, "they coniecture by the sight of the ground which way the floude came that "brought them thither, and so give a gesse at the place whence they were "broken off." Carew, *Svrvey of Cornwall*, (E. P.), f. 8.

"The shouders...pretend to such a nicety, as by the roughness or "smoothness of the shoad to tell you how far off the main load lies; nay, "to fit the very shoad, allowing for the wearing of it, to the place of the load "that it was broken off from by the flood." Carew, *Survey of Cornwall*, (Tonkin's Notes to Lord De Dunstanville's Edition), p. 29.

"Tin is [sometimes] found disseminated on the sides of hills, in single "stones, which we call Shodes, sometimes a furlong or more distant from "their lodes, and sometimes these loose stones are found together in great "numbers, making one continued course." Borlase, *Natural History*, p. 161.

"Shode [tin-ore] is disjunct and scattered, to some declined distance "from its parent lode, and is pebbly or smoothy angular." Pryce, *Mineralogia Cornubiensis*, p. 67.

"Shoad-stones are partially rounded and apparently water-worn; "they are found on, or at very small distances below, the surface; their "mineral characters are much the same as those of neighbouring lodes, of "which, indeed, it is supposed they were originally portions, removed by "diluvial action. As shode stones usually contain tin-ore they have been "carefully culled, and few now remain in the mining districts of Cornwall. "The Shoder commonly commenced his labours in low-grounds, where tin-"bearing diluvium abounded, and carefully sought tiuny shode-stones as he "ascended the neighbouring hills; as he advanced he found them in greater "numbers, and at length he traced them to, what he believed to be, the "parent lode." Henwood, *Quarterly Mining Review*, i, (1830), p. 403.

—like lead-ore in the north of England,*—native copper on the shores of Lake Superior,†—and gold in the mountain-*cascalho*‡ of Brazil,—it has occurred—and, to some trifling extent, still occurs—in, more or less, abraded masses on the slopes of many hills; and this so frequently that, during early periods of Cornish mining industry, they were—and, indeed, to some extent, they still are—traced as guides to the *lodes* whence they had been riven. Such transported masses, however, are limited to slopes in no particular direction; but owing to the contour of the surface§ and the general directions of the *lodes*,‖ they have been more numerous on the northern¶ and southern than on the eastern and

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* "Shoad ore is a pretty sure indication of a vein where it is found, or "a little above, or higher on the acclivity of the surface; but you must judge "of the distance above, by the greater or less acclivity of the slope....The "shoad ore is found...in rough irregular globes...of all sizes, from very "large masses, down to the size of peas, and smaller grains,...and is fre- "quently coated with white on the outside....Float ore differs from the "shoad; the former being water-worn, the latter not. The float ore is "generally mixed with water-worn bullets and gravel; the shoad never, "unless it has been washed off the superficies of the vein by some stream "of water." Forster, *Section of the Strata between Newcastle and Cross Fell*, pp. 276—278.

† "Ten leagues south of Lake Superior there is a single lump of native "copper about four tons weight...but no vein of copper has been discovered" "[in the neighbourhood.] Pryce, *Mineralogia Cornubiensis*, p. 61.

"It is well known that transported masses of native copper are occa- "sionally met with in the diluvial deposits which are abundantly spread "over the country...south of Lake Superior." Houghton, *Silliman's Journal*, xli, p. 29.

"Fragments of metallic ores and native copper,—the latter sometimes "weighing several hundred pounds...occur occasionally...in a layer of clay "resting either on coarse drift or...on the rock." Foster and Whitney, *Report on the Geology of Lake Superior*, pp. 186—191. (Abridged).

"About [1864] two years since [a mass of copper] which weighed about "eighteen tons was found loose on the drift covering the rock...near Portage "Lake." Bauerman, *Quarterly Journal of the Geological Society*, xxii, p. 452.

‡ "There is a difference between the *cascalho* in the mountains and "that in the rivers; the embedded stones in the mountain-*cascalho* are "rough and angular, but in that of the rivers they are rounded."

Manoel Ferreira da Camara, (Southey's), *History of Brazil*, iii. p. 827.

§ De la Beche, *Report*, pp. 19—20; *Fig.* 1. *Ante*, pp. 233—235.

‖ Henwood, *Cornwall Geol*: *Trans*: v, pp. 250—254, *Pl.* xi, *Fig.* 5, *Table* ciii; *Ibid*, viii, p. 674, Note†; *Journal of the Royal Institution of Cornwall*, iv, (No. xiii), p. xvi; *Annales des Mines*, 7me Serie, ii, p. 172.

¶ An instructive example of *shode-tin-ore* has been lately discovered by the Reverend William Borlase, M.A., Vicar of Zennor, in the ravine which bounds his glebe, and within gun-shot of the Bristol Channel.

western declivities; but whether alike plentiful on opposite sides of the water-shed* seems unknown.

It has been shown† that a slightly elevated body of slate extends from the northern slope of Hensbarrow and Killivreth Down,—surrounds the granite of Castle an Dinas and of Belovely Beacon,—and merges in the schistose strata which border the Bristol Channel. North-east of this elevation both the rocks and the—more or less—rounded detritus in the moors of Saint Austell and Lanlivery are almost exclusively granitic;‡ south-west of the dividing range, however, the *shelf*, the *tin-ground*, and the *overburden* are for—by far—the most part of slate *and elvan*, mixed, at intervals, with small proportions of granite,§ all bearing traces of abrasion. But whilst the band of schistose rocks maintains a higher level than the dissimilar—though it may be contemporaneous—beds of *detritus* on either side, it is much lower than the peaks, ridges and slopes of Hensbarrow, Killivreth Down, Helmen-Tor, Belovely Beacon, and Castle an Dinas; from the rocks,‖ *lodes*, and thin strings of vein-stone, from some of, if not from all, which—small as their produce has been of late years—both the *tin-ground* and the overlying *débris* are assumed to have been derived,¶ whilst this boundary of slate, between the different kinds of transported matter, is, itself, free from all trace of detritus. Moreover the rather considerable tract of cultivated land which surrounds the village of Tregoss and the hamlet of Pendean,—though bounded on three of its sides by the refuse of ancient *stream-works***—bears no specimen of *drift*, or evidence of diluvial action.††

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* *Ante*, pp. 233—235.

† *Ante*, pp. 212, 218.

‡ *Ante*, pp. 213—216.

§ *Ante*, pp. 216—218.

‖ Boase, *Cornwall Geol*: *Trans*: iv, p. 252. Henwood, *Ibid*, v, p. 120, Note. *Ante*, p. 212.

¶ "Those who have studied the decomposed granite near Saint Austell, "traversed as it is by a multitude of branches and strings of oxide of tin, "would have little difficulty in perceiving that if a body of water were made "to rush over it, the decomposed granite would be readily removed, and that "the broken-up strings and branches of tin-ore would be rolled into pebbles, "and distributed just as the stream-tin now occurs down the valleys in the "neighbourhood." De la Beche, *Report*, p. 398.

** *Ordnance Geological Map*, Sheet xxx.

†† Boase, *Cornwall Geol*: *Trans*: iv, p. 248. *Ante*, p. 218, Note†.

If—whilst *stream-tin* was deposited in the valleys, and *shodes* were scattered on more elevated parts of the surface—tin-ore was also swept into the sea,* it must now be—as on shore—concealed by more recent deposits;† for, during the recent Hydrographical Survey, soundings—almost without number—failed to detect anything of the kind,‡ in even of a single instance.

The granite of Cligger-head§ is traversed by narrow veins of quartz; and both the rock and the veins contain tin-ore. The action of the sea saps the base of the cliff; and large portions of it fall almost every winter. These are rapidly disintegrated by the waves; and the ore they had contained is gleaned by a few poor people, who earn a scanty livelihood by preparing it for market. On several other parts of the coast small quantities of tin-ore are collected;‖ but most of it, if not the whole is sepa-

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* "Granite and tin-stone shingle occur round the Land's-end and "Scilly Islands." Austen, *Quarterly Journal of the Geological Society*, vi, p. 76.

† "If the mines [of Scilly] had ever been very productive of tin, "some traces of diluvial tin-ore would, even in modern days, be from time "to time found in the low-grounds, but in neither of them has any tin-ore "been discovered within the recollection of the oldest inhabitant, nor is "there a record of such a fact at any former period; neither has any tin-ore "ever been found pulverized amongst the sands of the sea shore, as it fre-"quently is in the mining parts of Cornwall which border on the sea." Carne, *Cornwall Geol*: *Trans*: vii, p. 153.

‡ Captain (now Rear Admiral) George Williams, R.N. Officer in charge of the Hydrographical Survey, MS.

§ Sedgwick, *Transactions of the Cambridge Philosophical Society*, i, pp. 131—132. Boase, *Cornwall Geol*: *Trans*: iv, p. 303. Henwood, *Ibid*, v, p. 94. Von Oeynhausen and Von Dechen, *Phil*: *Mag*: *and Annals*, v, p. 169. Thomas, (R.), *Mining Review*, ii, p. 265. De la Beche, *Report*, p. 162.

‖ Borlase, *Natural History*, p. 164. *Ante*, p. 197, Note

"Small quantities of tin-ore are frequently thrown up by the sea, on "the beach below the Little Bounds engine [in Saint Just.] One or more "workmen may generally be seen, on the return of the tide after high-water, "searching for tin-ore amongst the sand and shingle. It is probable that "this comes from the back of some of the tin-lodes which run under the "sea." Carne, *Cornwall Geol*: *Trans*: ii, p. 342.

"Tin-ore was found in small quantities, many years ago, a little below "high-water-mark, on the margin of the Loe-pool at the bar, close below the "furnace discovered in 1860." Rogers, *Report of the Royal Institution of Cornwall*, xl, (1863, p. 80).

"From a stratum, also between high and low water, on the sea-shore at "Gunwalloe fishing cove, tin-ore is now about to be returned, under a licence "from the Duchy of Cornwall. This, however is visible only on occasions "of unusual stripping of the shingle, from the rocks at the base of the cliff; "and occurs (as I am told by the holder of the licence) in little dishes or "hollows in the face of the rock." Mr. Rogers, of Penrose, MS.

Hunt, *Mineral Statistics*, 1870, p. 8.

rated by the action of running water,* or of the sea, from the waste which escapes in neighbouring mines.

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* "Tin is also found among the slime and sands of rivers and of the "seashore (as in some crecks of Falmouth harbour several lords of the soil "have lately experienced to their advantage) washed down probably from the "hills, and resting in such sheltered situations that the sea has not power "to carry it off." Borlase, *Natural History*, p. 164.

"Besides stream-works, we have another sort...occasioned by the refuse "and leavings from the stamping-mills, &c., which are carried by the rivers "down to the lower grounds...I have been told that about seventy years "back, [1708] the low lands and sands under Perran Arworthall, which are "covered almost every tide with the sea, have, on its going off, employed "some hundreds of poor men, women, and children, incapable of earning "their bread by any other means." Pryce, *Mineralogia Cornubiensis*, p. 135.

"The sand on Marazion *green* [affords]...sufficient tin-ore to pay in some "measure for its *streaming*, which process, on a small scale, is here in "operation." Boase, *Cornwall Geol: Trans*: iii, p. 178.

"At Polladan-cove [in Saint Just] portions of the sea-sand are often "collected and *dressed* for sake of the tin-ore deposited amongst it by the "rivulet flowing through the *dressing-floors* in Nancherrow-vale. Wherever "there is a strip of beach at the base of the cliff persons are employed to "collect any stones containing tin-ore; whether these may be separated "from the rubbish of the mines by the action of the waves, or torn from "the *backs of lodes* beneath the sea, is difficult, if not impossible, to deter-"mine." Henwood, *Ibid*, v, p. 8.

Hunt, *Mineral Statistics*, 1870, p. 8.

"Tin-ore is now being got—under licence from the Duchy—from the "sand brought down and deposited by the river Cober, at the head of the "Loe-pool during winter, when the water rises some feet above the ordinary "surface." Mr. Rogers, MS.

"Small streams which rise amongst the hills south of Camborne, Tuck-"ingmill, and Pool, are—in various parts of their course to the sea near "Gwithian—used for *(dressing)* washing the produce of *Condurrow*, Dolcoath, "*Cook's-kitchen*, *North Roskear*, *Wheal Crofty*, *Tin-Croft*, and some other "mines; but from each mine they carry off, in suspension, small quantities "of tin-ore still adhering to its matrix. The separation which *stamping* "and other processes had failed to accomplish at first, is, however, gradually "effected by the action of running water; portions of ore are therefore "collected from lower parts of the stream, by appliances exactly similar to "those which had been inefficient to arrest them above." Thomas, *(Captain Charles)*, *Cornwall Geol: Trans*: viii, p. 354, Note‡.

It has been stated that of late thirty thousand Pounds worth of tin-ore has been collected annually from these streams.

"The ore which escaped from *Gongo Soco* [in Brazil] was treated a "second time at Taboleiro, about a mile from the mine, and yielded, on an "average about 3 (Troy) pound of gold per month." Henwood, *Ibid*, viii, p. 354.

The entire County now yields only about fifty tons of *Stream*-tin-ore a year.*

The Royalties *(Dues)* reserved by the owners of mineral rights, are, generally, higher in *stream-works* than in mines. In one instance—where the difficulty and risk are exceptionally great—the proprietors receive one-twentieth; in most other cases, however, they are content with from one-fifteenth to one-twelfth, but in one district—perhaps the roughest and poorest in Cornwall—the Lord exacts one-tenth of the entire produce.†

Ancient furnaces—locally known as *Jews'-houses*—have, from time to time, been discovered in various parts of Cornwall; and rudely moulded blocks of metal—generally called *Jews'-house-tin* have been found still more frequently. Such furnaces and masses of metal have—it is scarcely requisite to say—no necessary relation to detrital deposits; but the smelting-works and their products are often—perhaps mostly—found in the neighbourhood of the *stream*-works; and imperfectly smelted specimens of *Jews'-house-tin*,—sometimes obtained—consist of *stream*-ore mixed with charcoal and cemented by metallic-tin.‡ Neither furnaces nor blocks of *Jews'-house-tin*, however, have been numerous on the coast or at great elevations.

"At *Morro Velho* [in the same district] the ore which escaped "from the *dressing-floors* in suspension, was collected on the margin of a "neighbouring stream; where—by being again stamped and washed,—it "yielded from 1856 to 1863, one thousand three hundred and sixty five "(Troy) lbs. of gold." Symons, *Reports of the Saint John d'el Rey Company*, "xxvii, p. 40; xxviii, p. 47; xxix, p. 43; xxx. p. 43; xxxi, p. 48; xxxii, p. 60. Dietzsch, *Ibid*, xxxiii, p. 50; xxxiv, p. 49.

* Mr. Francis Michell of Calenick and Mr. Richard Wellington of Chyandour, MSS.

† "When a Streaming Tinner...takes a lease...he agrees to pay, the "owner or lord of the fee, a certain part clear of all expense...The consider-"ation is generally one sixth, seventh, eighth, or ninth,...or instead thereof, "he contracts to employ so many men and boys...and to pay the land-owner, "for liberty, from twenty to thirty shillings a year for each man, and...for "every boy...half as much as for a man." Pryce, *Mineralogia Cornubiensis*, p. 132.

‡ *Ante*, p. 226. Note.

Traces of ancient smelting-works *(Jews'-houses)* have been discovered in the various spots,—and described by the several authorities,—undermentioned :—

LOCALITIES.	AUTHORITIES.
WESTERN DISTRICT.	
Madron	Le Grice, *Cornwall Geol: Trans:* vi, p. 44.
Marazion-green	Edmonds, *The Land's-end District,** p. 9.
WESTERN-CENTRAL DISTRICT.	
Mawnan	Mr. Joshua Fox, MS.†
Gwennap	Francis (W.), *Gwennap, a Descriptive Poem*, p. 100, Note.‡
CENTRAL DISTRICT.	
Mawgan	Michell (J.), *Manual of Mineralogy*, p. 75.§
Withiel	*Gentleman's Magazine*, xcvi, p 125.‖
Lanlivery	Hare, *Mining Journal*, September, 1855.¶
EASTERN DISTRICT.	
North Hill	Rodd, (F.), *Report of the Royal Institution of Cornwall*, xxxii, p. 58.**

Block-moulds of stone have been met with, in, at least two instances;—

LOCALITIES.	AUTHORITIES.
WESTERN-CENTRAL DISTRICT.	
Gwennap	Francis, (W.), *Gwennap, a Descriptive Poem*, p. 100, Note ††.
EASTERN DISTRICT.	
North Hill	Rodd, (F.), *Report of the Royal Institution of Cornwall*, xxxii, p. 58.‡‡

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* Near the river immediately west of Marazion, and at from three to six yards beneath the sandy surface, ancient walls of unhewn stone, rudely made pottery, charcoal, ashes, and slag mixed with grains of metallic tin, and,—within a short distance,—fragments of bronze, were discovered. EDMONDS, *Transactions of the Penzance Natural History Society*, i, p. 348. *The Land's-end District*, p. 9.

† *Ante*, p. 201, Note §.

‡ *Ante*, p. 206, Note.

§ *Ante*, p. 226, Note.

‖ *Ante*, p. 227, Note.

¶ "From a *Jews'-house* discovered at Lanlivery by a *tinner* called John "Hare specimens of the ore, and the tin in a regular and refined state were "secured, but no blocks were found." HENWOOD, (GEO.), *Lectures on Geology and Mining*, ii, p. 11, Note.

** *Ante*, p. 232, Note †.

†† *Ante*, p. 206, Note.

‡‡ *Ante*, p. 232, Note.

Jews'-house-tin has been found in many parts of the western and central districts; but under various conditions, and in masses of unequal weight;

LOCALITIES.	WEIGHTS.	AUTHORITIES.
WESTERN DISTRICT.		
Saint Just	5·00lbs. Avoir.	Carne, *Cornwall Geol*: *Trans*: ii, p. 293.*
,, ...	6·00 ,,	Le Grice, *Cornwall Geol: Trans*: vi, p. 44.†
Madron (Bossuliack) ..	— ‡	
,, Trereife.....	26·00 ,,	
,, Tremethick ..	38·00 ,,	Whitley (H. M.), *Journal of the Royal Inst*: *of Cornwall*, No. xiii, p. xxxviii.§
WESTERN-CENTRAL DISTRICT.		
Gwinear	37·00 ,,	Carne, *Cornwall Geol*: *Trans*: ii, p. 293. Le Grice, *Ibid*, vi, p. 44.‖
Constantine	3·90 ,,	Mr. Hunt, F.R.S., Keeper of Mining Records in the Royal School of Mines MS.¶
Manaccan.....	0·47 ,,	Professor Tennant, F.G.S.; and Mr. Thomas Davies, F.G.S.; MS.**
,, moor	a fragment.	Mr. Rogers, of Penrose, MS.††
Saint Martin Meneage..	1·25 ,,	Dr. Jago, F.R.S., President of the Royal Institution of Cornwall MS.‡‡

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* *Ante*, p. 193, Note ‡. There may be some uncertainty whether this is not the first specimen referred to by Mr. Le Grice. *Cornwall Geol: Trans:* vi, p. 44.

† *Ante*, p. 193.

‡ This specimen was presented by Mr. Le Grice to the PENZANCE NATURAL HISTORY SOCIETY, *Cornwall Geol: Trans*: vi, p. 45. *Ante*, p. 193.

§ *Ante*, p. 193.

‖ *Ante* p. 199, Note †.

"The largest [mass] I have heard of weighed 34lbs., it was found in a "hedge in the parish of Gwinear, and having been offered for sale at the "Angarrack Smelting House, the Goth of a refiner put it at once into a ladle "and melted it down." LE GRICE, *Cornwall Geol: Trans*: vi, p. 44.

¶ This specimen is preserved in the Museum of Practical Geology, Jermyn Street, London.

** This specimen is in the British Museum.

†† "A small fragment of very imperfectly smelted tin,—supposed to be "*Jews'-tin*—was discovered on Manaccan-moor by Mr. R. J. Cunnack who "presented it to me. It was found in connection with fragments of what "had every appearance of slag." MR. ROGERS, MS.

‡‡ This specimen is preserved in the Museum of the Royal Institution of Cornwall. *Ante*, p. 203, Note.

WESTERN-CENTRAL DISTRICT, *Continued.*

LOCALITIES.	WEIGHTS.	AUTHORITIES.
Mawnan	3·--4lbs. Avoir.	Mr. Joshua Fox, MS.*
Near Truro	0·32 ,,	Professor Tennant, F.G.S.; and Mr. Thomas Davies, F.G.S., MS.+
Saint Agnes.....	7·70 ,,	Mr. Hunt, F.R.S., Keeper of Mining Records in the Royal School of Mines.‡
CENTRAL DISTRICT.		
Creed.....	11·50 ,,	Borlase, *Journal of the Royal Institution of Cornwall.* Supplement, i, p. 26.§
Saint Mewan	75·00 ,,	Mr. Francis Michell, MS.‖
Saint Austell	6·00 ,,	Borlase, *Journal of the Royal Institution of Cornwall*, Supplement, p. 25.¶
,, ...	80· ,,	Mr. William Petherick, of Saint Austell, MS.**
Lanlivery	46·25 ,,	Mr. Hunt, F.R.S., Keeper of Mining Records in the Royal School of Mines, MS.++
Roche .....about	20·00 ,,	Hitchins and Drew, *History of Cornwall*, ii, p. 587.‡‡
Mawgan	39·5 ,,	Michell (J.), *Manual of Mineralogy*, p. 75. Poole, *Journal of the Royal Institution of Cornwall*, i, (No. iv), p. 9.§§

The cabinets at Menabilly contain other specimens of *Jew's-house-tin.*

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* *Ante*, p. 201, Note§.

+ This specimen is deposited in the British Museum.

‡ ,, ,, ,, Museum of Practical Geology in Jermyn Street, London.

§ *Ante*, p. 226, Note.

"This specimen is deposited in the Museum of the Royal Society, London." BORLASE, *Journal of the Royal Institution of Cornwall*, i, Supplement, p. 26.

"For the satisfaction of the curious [a] specimen is deposited in the "Desk of Cornish Fossils at the Museum in Oxford." BORLASE, *Journal of the Royal Institution of Cornwall*, i, Supplement, p. 26. *Ibid*, p. 26.

A quantity of *Jews'-house* tin, cut into pieces of about an inch square, was lately offered for sale at one of the eastern smelting-houses.

‖ This slab remains at Calenick smelting-house, near Truro. p. 226, Note.

¶ *Ante*, p. 225, Note ¶¶. *Ante*, p. 226, Note.

** This remarkable mass is now in the collection of Mr. J. C. Daubuz of Killiow, *Ante*, p. 226, Note.

++ This specimen is preserved in the Museum of Practical Geology, Jermyn Street, London.

‡‡ *Ante*, 227.

§§ *Ante*, p. 226, Note *.

The foregoing columns show that masses of *Jews'-house*-tin have, of late years, been discovered not only in every part of Cornwall west of the Fowey and the Camel* which has afforded *stream-tin* ore, but that they have been obtained also in Meneage, a part of the County in which no tin-ore, of any kind, has ever been found. A few of them have been procured from primitive smelting-sites, and one was met with on the coast; but no single example has ever yet been brought to light in the neighbourhood of an ancient highway. The shapes of these blocks are often so irregular as to defy mere verbal description; but, perhaps, most of them show some approach to an oval on the upper side, thinning, however, from about the middle to the circumference on the lower; resembling, in fact, the rude *pigs* run from the small furnaces of native iron-smelters in the Himalaya,† or the lumps of iron cast—in hastily scraped pits—when the quantities of molten metal exceed the requirements of the founders. These *Jews'-house* blocks vary, from a few ounces to eighty pounds *(Avoir.)*, in weight. The specimens hitherto described,‡ have generally been invested with lead-coloured crusts of the oxide of tin; in some of which traces of chlorine§ have been detected.

I have now to offer my grateful acknowledgements to the Noblemen and Gentlemen who have afforded me opportunity for these enquiries, and my warmest thanks to the Superintendents of works, and working-men, whose advice and assistance have enabled me to finish these—my last—labours in the

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* Whether the eastern moorlands were formerly sprinkled, in like manner, with masses of *Jews'-house*-tin we have now no means of ascertaining; for it appears (Maclean, *Ante*, p. 190) that some centuries ago they had been in great measure exhausted.

† Traill, *Asiatic Researches*, xv, p. 138. Herbert, *Ibid*, i, p. 252. Henwood, *Extracts from the Records of Government* (Calcutta, 1855), p. 31.

‡ Borlase, *Journal of the Royal Institution of Cornwall*, i, Supplement, pp. 25, 26. Gregor, *Cornwall Geol*: *Trans*: i, p. 52. Michell, (J.), *Manual of Mineralogy*, p. 74. Collins, *Journal of the Royal Institution of Cornwall*, iii, (No. xiii), p. 83. Napier, *Ibid*, p. 84, Note. Percy, (Dr.), F.R.S. MS.

§ During high winds and heavy rains the windows in West Cornwall are often slightly obscured by thin incrustations of common salt.

field;* to some I am more deeply indebted than to others; but I fear to particularize, lest—by unintentional omissions—I may pain some to whom I am under the deepest obligations.

W. J. HENWOOD.

3, CLARENCE PLACE, PENZANCE,
1871—1873.

CORRECTION.

Page 199, line 8....*for* Marazion-march *read* Marazion-marsh.

Henwood, *Cornwall Geol*: *Trans*: v, pp. 3, 386; viii, p. 722.

	series, occasional masses of granite.		,, ,, 0·5 ,, S.W.
Treloy‡‡‡	Clay-slate, lamellar schorl-rock, quartz, stones of granite, and tin-ore mostly in the state of gravel and sand.	Clay-slate.	*Elvan*..... 1 mile W. Granite C. an Dinas 4·2 miles E. ,, St. Dennis 4·5 ,, S.E.
Mawgan§§§	.....	Clay-slate.	*Elvan*..... 1·7 miles S.W. Granite Castle an Dinas 5·2 miles S.E. ,, St. Dennis 6· miles S.E.
Netherton‖‖‖‖.....	Granitic matter, quartz, schorl-rock, masses of various vein-stones belonging to the granitic series, tin-stone, and crystals of tin-ore.	Granite, much disintegrated.	Clay-slate..... 0·6 mile S.E. *Elvan***** .... 1·5 mile S.E.
Penny-snap ..... Wheal Prosper¶¶¶....	Granitic matter, schorl-rock, fragments of various vein-stones subordinate to the granitic series, tin-stone, and crystals —as well perfect as fractured—of tin-ore.	Granite of unequal hardness.	Slate..... 6·2 miles W. ,, ... 5. ,, N.W. ,, ... 4·5 ,, N.

* *Ante*, p. 194.
† *Ante*, p. 195.
‡ *Ante*, p. 196, Note *.
§ *Ante*, p. 196.
‖ *Ante*, p. 197.
¶ *Ante*, p. 200.
** *Ante*, p. 204, 205.
†† *Ante*, p. 213.
‡‡ *Ante*, p. 214.

§§ Henwood, *Cornwall Geol*: *Trans*: iv, p. 62.
‖‖‖ *Ante*, p. 215.
¶¶ *Ante*, p. 217.
*** *Ante*, p. 218.
††† *Ante*, p. 219.
‡‡‡ Henwood, *Cornwall Geol*: *Trans*: iv, p. 65. De la Beche, *Report*, p. 405. *Ante*, p. 219.

§§§ *Ante*, p. 221.
‖‖‖‖ *Ante*, p. 230.
¶¶¶ Whitley, *Geological Map of the Caradon Mining District*. Henwood, *Cornwall Geol*: *Trans*: viii, p. 670.
**** *Ante*, p. 228.

TABLE I.

COMPOSITION OF THE TIN-GROUND, AND OF THE ROCKS ADJOINING AND IN THE VICINITY.

Locality.	Mineral Character: Of the *tin-ground.*	Of the *(Shelf)* rock beneath the *tin-ground.*	Of the strata adjoining the *Shelf* on either side.
Bosworlas*	Disintegrated granite, granitic vein-stones, tin-stone, and crystals of tin-ore either broken or entire.	Granite of unequal hardness.	Hornblendic slate, 1·6 mile N.W.
Bejowans†	Granitic matter, quartz, schorl-rock, various vein-stones of the granitic series, and small quantities of tin-ore, mostly *wood-tin.*	Granite, disintegrated.	Hornblendic slate, 1·4 mile N. The *Garth* mine yields wood-tin, 2·5 miles N.E.‡
Cold-harbour§	Granitic matter, clay, and rounded masses of vein-stones from the granitic series.	Granite of unequal hardness.	Hornblendic slate 1·4 mile N. ,, ,, 2·0 miles E. ,, ,, 2·8 ,, W.
Tregilsoe‖	Slate, quartzose slate, *elvan*, and vein-stones of the slate series impregnated with tin-ore, rounded and fractured granules of cassiterite.	Clay-slate, exceedingly soft.	*Elvans* within 0·5 mile N. & S. Granite.... 1·5 miles N.W. ,, 3·2 ,, S.E.
Carn-wartha Lezerea¶	Masses of granite, schorl-rocks, and vein-stones of the granitic series, mixed with granitic, schorlaceous, and quartzose sand and gravel, interspersed with rounded masses and angular fragments of tin-ore in the state of sand and gravel.	Granite disintegrated. Granite, traversed by veins of schorl and tin-ore.	Slate..... 3·2 miles N.W. ,, ... 2·7 ,, S.
Carnon**	Masses of granite, slate, *elvan*, and various vein-stones of both the granite and slate series, mixed with tin-ore either in large rounded bodies or in the state of gravel and sand.	Clay-slate, traversed by *elvans.*	Granite..... 2·8 miles W. ,, ... 3·2 ,, S.W. ,, ... 3·8 ,, N.W.
Pendelow††	Granitic, schorlaceous and quartzose matter, usually of the nature of sub-angular gravel, but mixed with masses of granite and vein-stones of the granitic series. Now and then, but very rarely, a few laminæ of slate occur.	Granite; usually more or less disintegrated.	Clay-slate.... 2· miles W. ,, ... 1·5 mile N.W. ,, ... 1·7 ,, N.
Levrean‡‡	Resembles *Pendelow* very closely; except that the *tin-ground* is here interlaid and divided by *(False-shelf)* a layer of disintegrated granite enclosing angular and subangular masses of granite, but it contains no tin-ore.§§	Granite of unequal hardness.	Clay-slate.... 2·2 miles W. ,, ... 1·8 mile N.W. ,, ... 2·1 miles N.
Pitmoor‡‡	Granite, schorl-rock, quartz, and vein-stones of the granitic series impregnated with tin-ore; which occurs also in the state of gravel or sand. Thin flakes of micaceous or talcose clay-slate are of very infrequent occurrence.	Granite of unequal hardness; often disintegrated.	Clay-slate.... 1·2 mile W. ,, ... 0·8 ,, N.
Lower Creany‖‖	Pale brown quartz, felspar, and granite, all in the state of gravel; broken masses and perfect crystals of tin-ore imbedded in clay. Masses of flint and crystals of gold occur at wide intervals.	Clay.	Granite beneath & on either side. Clay-slate..... 2 miles W. ,, ... 1·5 mile N.
Upper Creany‖‖	Of much the same character as in *Lower Creany*, which it adjoins.	Clay.	Clay-slate..... 2·2 miles W. ,, ... 1·3 mile N.
Golden-stream¶¶	*Elvan*, micaceous clay-slate, lamellar schorl-rock, quartz, various vein-stones of the slate series, and occasional stones of granite, with rounded grains and crystals of tin-ore.	*Elvan* sprinkled with tin-ore.	Micaceous clay-slate immediately adjoining. Granite..... 0·5 mile N.
Moss & Tellum's work.***	Micaceous clay-slate, lamellar schorl-rock, vein-stones of the slate series, quartz, *elvan*, now and then a stone of granite, slaty clay, and traces of tin-ore.	Clay-slate and laminated clay.	Granite..... 0·7 mile N.
Gun-deep***	.....	Clay-slate.	Granite, Castle an Dinas.. 2·2 miles N. ,, St. Dennis 0·4 mile S.
Gavrigan†††	Micaceous clay-slate, laminated schorl-rock, *elvan*, vein-stones of the slate series, occasional masses of granite.	Clay-slate.	Granite of Castle an Dinas 2·2 miles N.E. ,, St. Dennis 0·5 mile S.E. ,, ,, 0·5 ,, S.W.
Treloy‡‡‡	Clay-slate, lamellar schorl-rock, quartz, stones of granite, and tin-ore mostly in the state of gravel and sand.	Clay-slate.	*Elvan*..... 1 mile W. Granite C. an Dinas 4·2 miles E. ,, St. Dennis 4·5 ,, S.E.
Mawgan§§§	.....	Clay-slate.	*Elvan*..... 1·7 miles S.W. Granite Castle an Dinas 5·2 miles S.E. ,, St. Dennis 6· miles S.E.
Netherton‖‖‖	Granitic matter, quartz, schorl-rock, masses of various vein-stones belonging to the granitic series, tin-stone, and crystals of tin-ore.	Granite, much disintegrated.	Clay-slate..... 0·6 mile S.E. *Elvan***** .... 1·5 mile S.E.
Penny-snap Whsal Prosper¶¶¶....	Granitic matter, schorl-rock, fragments of various vein-stones subordinate to the granitic series, tin-stone, and crystals —as well perfect as fractured—of tin-ore.	Granite of unequal hardness.	Slate..... 6·2 miles W. ,, ... 5· ,, N.W. ,, ... 4·5 ,, N.

* *Ante*, p. 194.
† *Ante*, p. 195.
‡ *Ante*, p. 196, Note *.
§ *Ante*, p. 196.
‖ *Ante*, p. 197.
¶ *Ante*, p. 200.
** *Ante*, p. 204, 205.
†† *Ante*, p. 213.
‡‡ *Ante*, p. 214.

§§ Henwood, *Cornwall Geol: Trans:* iv, p. 62.
‖‖ *Ante*, p. 215.
¶¶ *Ante*, p. 217.
*** *Ante*, p. 218.
††† *Ante*, p. 219.
‡‡‡ Henwood, *Cornwall Geol: Trans:* iv, p. 65. De la Beche, *Report*, p. 405. *Ante*, p. 219.

§§§ *Ante*, p. 221.
‖‖‖ *Ante*, p. 230.
¶¶¶ Whitley. *Geological Map of the Caradon Mining District.* Henwood, *Cornwall Geol: Trans:* viii, p. 670.
**** *Ante*, p. 228.

* *Ante*, p. 196.

† *Ante*, p. 197.

‡ Borlase, *Natural History*, p. 222. Barham, (T. F.), *Cornwall Geol: Trans:* iii, p. 103. Boase, *Ibid*, p. 171. Henwood, *Ibid*, v, p. 34. Carne, *Ibid*, vi, p. 233.

§ *Ante*, p. 200.

‖ Rogers, (J. J.), *Cornwall Geol*: *Trans*: vii, p. 354.

¶ (From Lower Carnon to Narabo inlet). Smith, *Geol*: *Trans:* iv, p. 409. Henwood, *Cornwall Geol*: *Trans*: iv, p. 58; v, p. 21;* *Ante*, p. 205.

** (Below Narabo inlet). *Ante*, p. 204; 205 *Note*†.

†† Boase, *Cornwall Geol*: *Trans*: iv, p. 246. De la Beche, *Report*, p. 405. *Ante*, p. 216—218.

‡‡ Smith, *Geol*: *Trans*: iv, p. 407. Dufrénoy, Elie de Beaumont, Coste, et Perdonnet, *Voyage Métallurgique en Angleterre*, ii, p. 258. Winn, *Report of the Royal Institution of Cornwall*, xxi, (1839), p. 47. Stocker, *Transactions of the Penzance Nat: Hist*: *Society*, p. 88. *Table* III *Note*¶.

§§ Smith, *Geol*: *Trans*: iv, p. 408. Héron de Villefosse, *Richesse Minérale*, ii, p. 354. Colenso, *Cornwall Geol*: *Trans*: iv, pp. 32-33. De la Beche, *Report*, p. 401. Whitney, *Metallic Wealth of the United States*, p. 207. Cotta, *Ore-Deposits*, p. 421. *Table* III *Note*¶.

‖‖ Henwood, *Cornwall Geol: Trans:* iv, p. 63; *Ante*, p. 214-215.

¶¶ Henwood, *Cornwall Geol*: *Trans*: iv, pp. 61, 63.

*** *Ante*, p. 213.

††† This circumstance was first noticed by Mr. Ralfs, F.R.C.S.; *Ante*, p. 213, *Note*§.

‡‡‡ *Ante*, p. 213.

§§§ Rashleigh, *Cornwall Geol*: *Trans*: ii, p. 282. *The Ordnance Geological Map*, (Sheet xxxi), mentions the existence of a Raised Beach on both sides of Tywardreath-bay.

‖‖‖ De la Beche, (Barratt and Maclauchlan), *Report*, p. 403.

¶¶¶ Rashleigh, *British Minerals*, ii, p. 23; *Pl.* xxi. Maton, *Observations on the Western Counties*, i, p. 152.

**** Pattison, *Cornwall Geol*: *Trans*: vii, p. 36; *Pl.* i.

†††† *Ante*, p. 230.

‡‡‡‡ *Ante*, p. 230.

§§§§ *Ante*, p. 231.

‖‖‖‖ Borlase, *Natural History*, p. 220. Mr. W. J. Rawlings, MS.; *Ante*, p. 199.

¶¶¶¶ Henwood, *Cornwall Geol*: *Trans*: iv, p. 65; *Ante*, p. 219.

Seeds which had long been covered with a considerable thickness of sand and gravel, freely germinated on exposure to the air.

The Ordnance Geological Map, (Sheet xxx,) records the remains of a submarine forest at (Porth) the mouth of this valley. *Ante*, p. 219, *Note*‖.

***** Mr. William Leddicote, MS.; *Ante*, p. 221.

TABLE II.

COMPARISON OF VEGETABLE REMAINS IN THE UPPER AND THE LOWER PARTS OF THE SAME, AND OF DIFFERENT VALLEYS.

LOCALITIES.	VEGETABLE REMAINS, IN	
	Upper parts of the valley.	Lower parts of the valley.
	GROUNDS DECLINING TOWARDS THE SOUTH.	
Cold-harbour to Marazion-marsh	Peat*	Peat, enclosing nuts, leaves, and the branches, trunke, and roots of hazel, willow, and oak.‡
Tregilsoe ,, ,,	Peat†	
Wendron-moors to the Loe-pool	Peat, enclosing nuts and branches of hazel.§	Peat, enclosing nuts and the leaves, branches and trunks of hazel, oak, and other trees.‖ *(about a foot above low-water mark).*
Higher Carnon to Restronguet Creek	Silt, mixed with moss, leaves, nuts, the branches and trunks of hazel, alder, and oak, oyster—and other—shells, the remains of beetles, the horns and bones of deer, and human skulls.¶	Silt (hardened mud).** *(Some six feet above low-water).*
Tregoss moors	Peat, sometimes—but not very often—imbedding leaves, branches and slender trunks of alder and oak.††	
Pentuan ..... *Wheal Virgin, (upper works)*....		Rough shingle, gravel, sand, and silt; interspersed with trunks, branches, and leaves of trees, nuts, moss, rushes, and the wings of beetles.‡‡
,, ... *Happy Union, (lower works)*....		Separate layers of rounded rocks, shingle, gravel, and silt; containing in the deeper part, roots and trunks of oaks which had grown on the spot; in some spots oyster-shells still adhered to the rocks and trees; in shallower portions the gravel and silt were mixed with roots, trunks, branches and leaves of trees, nuts, moss, the horns of deer and bones of these, and of other animals, *(about thirty feet below low-water).*§§
Lanlivery and St. Austell higher moors to Tywardreath-bay	Peat *(fen)* often forms but one bed;‖‖ but it sometimes appears in two,¶¶ and even in three*** beds; passing into silt. The same bed is, now and then, divided into subordinate layers by extremely thin partings of granitic silt.††† Branches of furze, alder, and hazel, leaves, nuts, fern stems, and—less frequently—small trunks of oak, are imbedded in the peat.‡‡‡ Flints have been occasionally found.‡‡‡	Sandrycock, a mile above Par. Peat, *(fen.)*§§§ containing branches of hazel, alder, and willow.
		West of Par, sand, silt, wood, nuts, and other vegetable productions.‖‖‖
		Poth (Porth). Peat (fen), containing decayed vegetable matter, *(about twenty five feet below low-water at spring tide).*¶¶¶
Valley of the Fowey	Peat, in three beds divided by granitic gravel and sand.	
	The lowest bed contains remains of large trees;—	
	,, second ,, hazel trees, nuts and fern; with horns of deer;—	
	,, upper ,, peat only.****	
,, Netherton in St. Neot	Peat.††††	
,, Penny-snap *(Wk.: Prosper)* Alternun	Peat.‡‡‡‡	
Valley of the Lynher. Trewint-marsh	Peat.§§§§	
	GROUNDS DECLINING TOWARDS THE NORTH.	
Saint Erth		Peat, roots, trunks and branches of trees, with nuts in abundance.‖‖‖‖
Treloy.....St. Columb-minor		A thin layer of vegetable remains above the *tin-ground*¶¶¶¶.
Mawgan		A mingled mass of branches, leaves, nuts, and other vegetable remains over the *tin-ground.*•••••

* *Ante*, p. 196.

† *Ante*, p. 197.

‡ Borlase, *Natural History*, p. 222. Barham, (T. F.), *Cornwall Geol: Trans:* iii, p. 103. Boase, *Ibid*, p. 171. Henwood, *Ibid*, v, p. 34. Carne, *Ibid*, vi, p. 233.

§ *Ante*, p. 200.

‖ Rogers, (J. J.), *Cornwall Geol: Trans*: vii, p. 354.

¶ (From Lower Carnon to Narabo inlet). Smith, *Geol: Trans:* iv, p. 409. Henwood, *Cornwall Geol: Trans*: iv, p. 58; v, p. 21;* *Ante*, p. 205.

** (Below Narabo inlet). *Ante*, p. 204; 205 *Note*†.

†† Boase, *Cornwall Geol: Trans*: iv, p. 246. De la Beche, *Report*, p. 405. *Ante*, p. 216—218.

‡‡ Smith, *Geol: Trans:* iv, p. 407. Dufrénoy, Elie de Beaumont, Coste, et Perdonnet, *Voyage Métallurgique en Angleterre*, ii, p. 258. Winn, *Report of the Royal Institution of Cornwall*, xxi, (1839), p. 47. Stocker, *Transactions of the Penzance Nat: Hist: Society*, p. 88. *Table* III *Note*¶.

§§ Smith, *Geol: Trans:* iv, p. 408. Héron de Villefosse, *Richesse Minérale*, ii, p. 354. Colenso, *Cornwall Geol: Trans:* iv, pp. 32-33. De la Beche, *Report*, p. 401. Whitney, *Metallic Wealth of the United States*, p. 207. Cotta, *Ore-Deposits*, p. 421. *Table* III *Note*¶.

‖‖ Henwood, *Cornwall Geol: Trans:* iv, p. 63; *Ante*, p. 214-215.

¶¶ Henwood, *Cornwall Geol*: *Trans*: iv, pp. 61, 63.

*** *Ante*, p. 213.

††† This circumstance was first noticed by Mr. Ralfs, F.R.C.S.; *Ante*, p. 213, *Note*§.

‡‡‡ *Ante*, p. 213.

§§§ Rashleigh, *Cornwall Geol*: *Trans*: ii, p. 282. *The Ordnance Geological Map*, (Sheet xxxi), mentions the existence of a Raised Beach on both sides of Tywardreath-bay.

‖‖‖ De la Beche, (Barratt and Maclauchlan), *Report*, p. 403.

¶¶¶ Rashleigh, *British Minerals*, ii, p. 23; *Pl.* xxi. Maton, *Observations on the Western Counties*, i, p. 152.

**** Pattison, *Cornwall Geol*: *Trans*: vii, p. 36; *Pl.* i.

†††† *Ante*, p. 230.

‡‡‡‡ *Ante*, p. 230.

§§§§ *Ante*, p. 231.

‖‖‖‖ Borlase, *Natural History*, p. 220. Mr. W. J. Rawlings, MS.; *Ante*, p. 199.

¶¶¶¶ Henwood, *Cornwall Geol*: *Trans*: iv, p. 65; *Ante*, p. 219.

Seeds which had long been covered with a considerable thickness of sand and gravel, freely germinated on exposure to the air.

The Ordnance Geological Map, (Sheet xxx,) records the remains of a submarine forest at (Porth) the mouth of this valley. *Ante*, p. 219, *Note*‖.

••••• Mr. William Leddicote, MS.; *Ante*, p. 221.

TABLE III.

MINERAL COMPOSITION AND ORGANIC CONTENTS OF THE BEDS LAID OPEN IN VARIOUS STREAM-WORKS.

Vertical Scale 0·01.	Carnon. *Narabo inlet.*	Carnon. *Restronguet creek.*	Pentuan. *Happy Union (lower works).*	Poth (Porth).†† *Lower works.*
6.			SURFACE.	SURFACE.‡‡
High water.	SURFACE.		River gravel and sand;‡ mixed, in some spots, with silt and sea-sand.	Beneath a shallow covering of vegetable mould, many thin beds of micaceous sand and earth.
10.	Sand and mud.*	SURFACE.		Earth slightly mixed with mica.
	Silt and shells.			Peat.
	Sand and shells.	Mud.*		
Low water.			Sea-sand; imbedding timber (mostly oak) trees, prostrated in all directions; together with bones and horns of red deer§ and of very large cattle,§ as well as the remains of boar,§ and human skulls.‖ Above the level of these, and much nearer to the harbour the bones of a whale¶ belonging to a species (*Eschrichtius robustus*, Gray,) now unknown in the British seas, was also imbedded in the sand.	Clay mixed with vegetable matter.
20.	Silt.	Mud and sand.*		Earth containing remains of vegetables, and (?) earthy phosphate of iron.
	Sand and shells.	Silt.*		Fine sand.
30.				Coarse sand.
	Silt charged with large quantities of shells.	Silt mixed with oyster, cockle, and other shells.		Rough sand. Horns of deer and of the wild ox.§§
			Silt mixed with stones, and sometimes with wood and bones.	
			Sea-sand mixed with shells.	Peat mixed with small decayed vegetables.
40.			Silt mingled with shells, wood and nuts, and sometimes with the bones and horns of deer and cattle.**	*Tin-ground.*
				Shelf. Clay-slate and yellow clay.
50.	Silt, in some places mixed with stones.			
			Branches, leaves, nuts and moss. Silt.	
			Tin-ground.	
60.		Silt, (sometimes with, but frequently without shells). Gas is given off by this bed and by the *tin-ground* on exposure to the air; on two occasions slight explosions have taken place. Horns of deer and bones have been occasionally found here.		
	Vegetable remains, oyster shells, bones, and horns of deer, and human skulls.†		*Shelf.* Clay-slate.	
	Tin-ground.			
70.	*Shelf.* Clay-Slate.			
		Tin-ground. The lower part is generally the richest; but it is sometimes overlaid by even richer ore, mixed with earthy ingredients of different character.		
80.		*Shelf.* Clay-slate.		

Carnon.

* "If the streams which enter Restrongett-creek be charged ordinarily with [one part of earthy matter "to three hundred parts of water] sometimes they contain more than double that quantity, there will be "brought down annually about two millions and a half cubic feet of sand and mud, besides immense "quantities of gravel, which during heavy rains are swept along the beds of streams, and ultimately into "the navigation: the gravel principally lodges where the back-water meets the tide, and encroaches "regularly on the creek." THOMAS, (R.) *History of Falmouth*, p. 51.

"In 1812 a crucifix [now in our Museum] was found [in] Carnon stream-works, about 30 feet under "the bed of the river." BARHAM, Address to the Royal Institution of Cornwall, *Report*, xlii, 1860, p. 16.

"At Higher Carnon, nearly two miles above the present navigation, some rather remarkable slabs of "granite formed a narrow road, which—from 1815 to 1820 or thereabout—was some three or four feet "above the ordinary level of the stream; in 1867, however, this ancient bridge had become buried beneath "about two feet of *detritus*. Within fifty years therefore, a body of rubbish brought down by the river "had raised the surface of the valley five or six feet; that is to say, at the rate of about one foot in ten "years." HENWOOD, Address in 1870. *Journal of the Royal Institution of Cornwall*, iii (No. xi,) p. xvii.

† "Imbedded in mud mixed with shells have been found several branches and trunks of trees, some "of which had evident marks of being cut with an axe or other sharp instrument; *horns* and *bones of stags*, likewise human skulls."

SMITH, *Geol*: *Trans*: iv (O. S.—1807), p. 409.

Fragments of a human skull from Carnon were—some fifty years ago—preserved at Perran Wharf, in a cellar belonging to Messrs. FOX, who had been largely interested in the stream works.

"Seaward this bed is replaced by silt mixed with stones." HENWOOD, *Cornwall Geol: Trans*: iv, p. 59.

Taylor (C. D.) *Proceedings of the Institution of Mechanical Engineers*, (Cornwall Meeting), p. 159.

Pentuan.

‡ The rivulet flowing from the hills of Saint Stephens and Saint Mewan to the sea at Pentuan is not on all occasions of force sufficient to carry throughout its course, all the earthy matter it brings down in suspension. At times, therefore, the accumulation of mud causes the stream to overflow its banks and to injure the adjoining meadows.

§ All these had been examined and named by the late Mr. Clift, F.R.S., Curator of the ROYAL COLLEGE OF SURGEONS, before they were presented to the ROYAL GEOLOGICAL SOCIETY OF CORNWALL, by Mr. Colenso in 1829. *Cornwall Geol*: *Trans*: iv, p. 35.

‖ "At thirty one feet from the surface have been found many bones of animals, viz. the horns of "two deer, very large and of equal size; two human skulls, one belonging to a child, the grinders not "having yet shot through the jaw; the shoulder and thigh-bone of some large animal, and the vertebræ "of some smaller animals." SMITH, *Geol*: *Trans*: iv (O. S.), p. 406. FLOWER, *Annals and Magazine of Natural History*, ix, (Fourth Series), p. 440.

Photographs of the front, side, and top of the skull obtained by Mr. Colenso, were submitted to Professor Owen, M.D.; D.C.L.; F.R.S., who found them to differ in no essential respect from those of ordinary British crania.

¶ These bones were displayed by the ROYAL GEOLOGICAL SOCIETY OF CORNWALL for more than thirty years, without awakening a suspicion that they differed, in any respect from those of any variety of whale still frequenting the coast of Cornwall. In 1861, however, a single vertebra—supposed to have been entombed in the sub-marine forest of Torbay—was cast ashore at Babbacombe, and fortunately secured by Mr. Pengelly, F.R.S., F.G.S.; by whom it was submitted to Dr. J. E. Gray, F.R.S., V.P.Z.S., and Professor Flower, F.R.S., V.P.Z.S.; who by correspondence and interchange of drawings with Professor Lilljeborg of Upsal ascertained its identity with one of the vertebræ of a specimen which had been found imbedded in sand at Gräsö in the Baltic. (GRAY, *Annals and Magazine of Natural History*, xv (Third Series) p. 492. These circumstances, and the subsequent discovery of a corresponding bone in the same neighbourhood, induced Mr. Pengelly to suspect that similar remains might be obtained from equivalent submarine forests on other parts of the coast, and that Mr. Colenso's specimen might bear some relation to his own. (*Report of the* DEVONSHIRE ASSOCIATION OF SCIENCE AND ART, for 1865). In 1872 Mr. Colenso's specimens were examined by Professor Flower, who pronounced them to be, "(1) the right ramus of the mandible or "lower jaw, (2) a lumbar vertebra, (3) a humerus, (4) a radius, (5 and 6) two metacarpals;" and he observes "that these bones belong to no species of whale known to inhabit the British seas;" and that "the "peculiar form of the mandible and the relative proportions of the different bones to each other exclude "not only all these, but all existing whales. On turning to...descriptions of whales, supposed to be extinct, "...I was able to identify [these remains] with those of a specimen found under somewhat similar circumstances in the island of Gräsö....This specimen...constitutes the type of the genus *Eschrichtius* "of Gray,...*Catalogue of Seals and Whales in the British Museum*, 1866, p. 133." FLOWER, *Annals and Magazine of Natural History*, ix (Fourth Series), p. 440.

Austen, *Quarterly Journal of the Geological Society*, vii, Pl. 6.

Whether a bone obtained by the PENZANCE NATURAL HISTORY SOCIETY from the submarine forest at Porthleven (ROGERS, *Cornwall Geol*: *Trans*: i, p. 236) may have belonged to a whale of the same, or of a different, kind has not been determined.

** "Imbedded in this silt about two feet from the top [and thirty eight feet below the surface] was "found a piece of oak that had been [shaped] by the hand of man; it is about six feet long, one inch "and a half broad, and less than half an inch thick; this is the greatest depth at which I have ever seen "any converted substance. It appears to have floated in the sea; as at one end, which is much decayed, "a small barnacle has fixed its habitation." COLENSO, *Cornwall Geol*: *Trans*: iv, p. 35.

POTH (PORTH).

†† Rashleigh, *British Minerals*, ii, p. 24, *Pl.* 21

‡‡ "The salt water would flow into Poth, were it not prevented by a flood-hatch." RASHLEIGH, *Cornwall Geol*: *Trans*: ii, p. 284.

§§ "A variety of animal substances are found here, nearly at the bottom of the sea-sand, and upon "the sea-mud, such as the horns of Deer and the wild Ox." *Ibid*, p. 283.

"At Par a raised beach is found inside the former estuary."

DE LA BECHE, *Report*, p. 425.

III.—*On the occurrence of Wood-tin ore in the Wheal Metal lode at Wheal Vor in Breage.*—*By* Mr. William Argall, *Cashier of the Mine.**

Read at the Spring Meeting, May 16, 1873.

THE variety of ore which, from its structure, is known as *wood-tin*, has been so very rarely found in *lodes*† that no detail respecting it can be devoid of interest.

The ancient and well-known mine of *Wheal Vor*—situate on an elevated plain of chloritic slate, immediately east of Tregoning-hill, an isolated body of granite—has, perhaps, afforded more tin-ore than any other tract, of equal extent, in Cornwall.

The *Wheal Metal lode* bears 10°-15° N. of E.—S. of W., and—like most of the other *lodes* in *Wheal Vor*—dips some 65°-80° N.

Some six or seven years since, traces of *wood-tin* were discovered about 180 fathoms from the surface west of the *Metal* shaft; and, within a few months, ore of much the same character has been found at some 200 fathoms deep, 80 fathoms further east in the same *lode*, which maintains for some considerable extent an average width of about two feet. Almost suddenly, however, it attains a breadth of six feet, and the vein-stone, at the same time, becomes less quartzose, more chloritic, and contains a larger proportion of crystalline tin-ore of the ordinary character. These are sometimes separately aggregated, though frequently they are, more or less, mixed; but—whether the ingredients are earthy or metallic—the *wood-tin* occurs either in scattered grains, in small isolated masses, or in veins of unequal, yet always of inconsider-

* Communicated by William Jory Henwood, F.R.S., F.G.S., Member of the Institution.

† Majendie, *Cornwall Geol: Trans:* i, p. 238. Carne, *Ibid*, ix, p. 97. Henwood, *Ibid*, v, p. 32. Henty, *Proceedings of the Miners' Association*, (1867), p. 55.

able width; and these—even when no thicker than paper—display the most capricious and complicated flexures, and still preserve a fibrous structure. Both in the broader parts of these narrow veins, and in the small bodies of ore, whether imbedded in ordinary cassiterite or in earthy ingredients, radiated-crystalline,—as well as a concentric lamellar-structure prevails, the successive rings or cylinders of ore being alternately of clove-brown, and of brownish yellow, hue.* These aggregations of divergent crystals sometimes enclose kernels of ordinary tin-ore; but now and then they radiate from minute cavities *(vughs)*, which—in such cases are lined with microscopic pyramids of cassiterite.

As *wood-tin-ore* has been so rarely found in *lodes*, and in no case, yet recorded, from so great a depth as in *Wheal Vor*, I venture to hope that the foregoing description of the conditions under which it occurred, may not be uninteresting. One of the best specimens of *wood-tin-ore* yet obtained here accompanies this memorandum, and I shall be gratified to find that it has been found worthy of a place in the Museum of *The Royal Institution of Cornwall.*

Wheal Vor, 23rd April, 1873.

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* Phillips, W. J., *Introduction to Mineralogy*, (Third edition), p. 253.

IV.—*On Dynamite, in its sanitary aspect.*—*By* Dr. Hudson, *Redruth.*

Read at the Spring Meeting, May 16th, 1873.

FOR a considerable number of years, the fact has been recognized that the occupation of mining is much less satisfactory, from a sanitary point of view, than other forms of out-door work. The genuine miner has not only his fair proportion of trivial diseases, but, in addition, suffers from various affections of the respiratory organs, which almost double his mortality when compared with that of the non-mining population of the neighbourhood in which he resides. The causes of this excessive mortality were fully investigated by the Kinnaird Commission, some ten years ago. Briefly, they are: imperfect ventilation, candle-smoke, powder-smoke, and, in dry mines, dust from boring and the use of the pick. Year by year the system of ventilation has been improving; and, I understand, it is comparatively rare to find a mine very deficient in that respect. At various stages, in the "rising of winzes," or driving of levels, it is quite unreasonable to expect the circulation of a free current of air, as these operations require time for their completion. The question then arises: can anything be done, beyond the employment of the fanning machine, in lessening the amount of foreign matter with which the stagnant air of "close ends" is charged.

Dr. Angus Smith has studied the chemistry of the air of mines, and has published his results, in a most elaborate and complete form. He ascertained the main deleterious ingredients to be, organic matter, carbonic acid, and powder-smoke. The organic matter was attributed to decaying wood; and the carbonic acid to the act of breathing, the burning of candles, and the explosion of gunpowder. Gunpowder contributes to the impure state of the air in yet another way. Among the injurious compounds resulting from its explosion, a prominent place must be given to sulphide of potassium, which is believed to have an effect on the body, when inhaled, similar to sulphuretted hydrogen, though acting very slowly. It is not usual for perfect combustion to take place;

hence we find, among the solid bodies floating in the air, crystals of nitre and particles of black carbon.

The injurious influence of gunpowder on the health of miners having been established, experiments were made with gun-cotton, in 1864, with the view of testing its suitability for replacing gunpowder in mining operations; but without any definite result.

Since the discovery of Nitro-glycerine by Sobrero, some 25 years ago, chemists who had been acquainted with the compound saw that we had an agent of great power, if means could be devised for controlling it during use. It was a mere scientific curiosity till the end of 1864, and could not be obtained in commerce. It is prepared from the slow action of nitric and sulphuric acids on glycerine. Perfect explosion of the chemically pure nitro-glycerine yields aqueous vapour, carbonic acid, oxygen, and nitrogen. These gases expand to such an extent as to make an equal bulk of nitro-glycerine 13 times stronger than gunpowder. Apparently we have here a powerful explosive, forming gases which, by Graham's law of diffusion, would in a short time so intermix as to be comparatively harmless. This is, however, not the case. Dr. Gladstone ascertained, while engaged in his researches on nitro-glycerine, that the compound was safe and stable, only when prepared with the purest acids and perfectly anhydrous glycerine. Careless manufacture has produced an unstable compound, liable to spontaneous decomposition, accompanied by the development of gases, which, by exerting pressure on the fluid within, have caused it to explode on such slight concussion as shaking the vessel containing it.

During the slow spontaneous decomposition, various injurious products are formed: oxalic-, hydrocyanic-, and glyceric acids, ammonia, and some others unknown. From imperfect storage or careless manufacture, disastrous accidents became so frequent as to induce regulations to be made in most countries with reference to its storage and transit; indeed, these are so stringent as to almost prohibit its employment in mining or quarrying, unless made on the spot. That a valuable agent was in a fair way of being lost may be gathered from a statement made by the contractor of the Central Pacific Railroad, who said that in driving a tunnel they could go 25 per cent. faster with nitro-glycerine than by using gunpowder,—smaller holes, drilled in one-third the time,

and greater execution,—the rock broken more distant from the hole,—and, what is most important, it appears they had not a premature explosion or other accident, and not a single blast missed fire since the Chinamen commenced filling the cartridges.

In 1867, Nobel of Hamburgh introduced an article named Dynamite, or patent safety-blasting powder. It is a compound of nitro-glycerine and a silicate, packed in cartridges; is said to be seven times stronger than gunpowder, and requires for its explosion the combined effect of both spark and concussion. It would seem that in dynamite we have all the economic value of nitro-glycerine, without its instability and danger. Like nitro-glycerine, it can be fired under water. Slowly it is making its way in our West Cornwall Mines. The stories told of the feats it has performed in the smashing of stamps' heads, &c., indicate its power, while the murmurs prevalent during a dynamite famine —and, owing to the strict legal rules concerning its transit, deficiencies of supply are not infrequent—show that it is valued.

I will now refer to the sanitary aspect of the question; how it is likely to bear on the health of our miners, and how, if it replace gunpowder, the vital statistics of the next generation may be altered.

From conversation with Mine Surgeons, I am inclined to think that accidents are more frequent since its introduction. This was, however, to be expected. Some little experience is required in the method of employing a new explosive, before agents can with confidence give the necessary instructions; and, perhaps, accidents fulfil the functions of a teacher, by inspiring the men with due caution.

There is a marked difference between a dynamite accident and one in which gunpowder has been the explosive. It arises from the extraordinary force with which the dynamite acts: if an eye be injured, the chances are greatly in favour of the globe having been penetrated; if there be a flesh wound, the parts do not present the blackened charred mass so frequently seen with gunpowder, but the skin is speckled with pieces of the *cap*, or surrounding mineral, which occasionally lodge to the depth of an inch, and the edges of the wound are in some cases regular and even, as if cut with a bluntish knife. Temporary deafness from concussion is not uncommon.

When we remember that dynamite contains about 75 per

cent. of nitro-glycerine, and owes all its power to that ingredient, we can to some extent explain the symptoms which inhalation of its gaseous compounds after explosion produces, by a reference to the chemistry of nitro-glycerine. And so we find, in practice, that complete explosive decomposition originates no very unpleasant effect. It is, however, rare that complete explosive decomposition occurs. Miners *will* overcharge the holes, and portions of the dynamite distant from the cap are resolved, not into the simple carbonic acid, oxygen, aqueous vapour, and nitrogen, but into higher organic compounds, such as acrolein, oxalic acid, hydrocyanic acid, and oxides of nitrogen. Dr. Gladstone has suggested that the acrolein is more likely to come from traces of glycerine which have neither been converted nor washed out, than from pure nitro-glycerine. Miners who employ dynamite complain of head-ache—a peculiar pain in the back of the head, or upper part of neck—and, briefly, affections of the mouth, eyes, larynx, throat, and lungs, indicative of the inhalation of some irritating vapour. It is not necessary for me to give particulars, in detail; I may add, however, that a great many diseases are attributed to dynamite where, on careful inquiry, we cannot discover a trace of connexion.

I believe acrolein, or acrylic aldehyde, to be the head and front of the offending. It is a complex organic compound, found in large quantities during the distillation of glycerine, and has received its name from its intensely irritating effects upon the mucous membrane of the eyes and organs of respiration; and I am indebted to Mr. S. J. Rowe, of Redruth, not only for the suggestion, but for the trouble kindly taken in going underground with me and, by means of test solutions, air-pump, and suitable apparatus, verifying the fact.

Mr. Bottomley, assistant to Sir Wm. Thompson, the Professor of Natural Philosophy in the University of Glasgow, in correspondence with me has suggested the use of respirators, so as to get rid of the vapours complained of. He writes that Mr. Whitehouse, the electrician, has made respirators of caustic potash for men working in a factory where large quantities of nitrous fumes were given off, and that complete protection was given. Potash would also neutralize the acrolein. Such respirators could be made for a few pence, and no doubt would prove effectual. Dr. Gladstone, in a letter to Mr. Bottomley, asks "what would be the effect of

sending ammonia into the air? A little of the strong liquor ammoniæ might be sprinkled about the 'close end,' just before the blasting took place"; he adds that he "does not know how to contend against acrolein better than by the respirators you suggest." At present there is a dearth of dynamite; so we must postpone a trial of these methods.

Reverting to the question of mortality, there is now—owing to the Registrar General's Return, and the admirable Tables compiled therefrom by Mr. Robert Blee—no doubt that the Cornish Miner is shorter lived than either his agricultural neighbour, or his fellow miner in the North of England; and this increased mortality, between the ages of 40 and 60 years, is due to affections of the respiratory organs. Much has been written on miners' asthma and miners' consumption. It is unquestionable that tubercular disease exists, in some cases; but, in by far the larger proportion, the symptoms presented are not only not those of tubercle, but are similar to those presented by flax dressers, knife grinders, stone polishers, paper teazers, rag pickers, and others who work at dusty occupations. In all, particles of solid matter enter the lungs, set up irritation mechanically, and excite chronic inflammation in the bodies of those people when, either by hereditary or acquired debility, retrogressive molecular changes preponderate over the progressive.

An incalculable amount of good has been done to the miners of Camborne, Illogan, and Redruth, by the unparalleled generosity of Lord Robartes, in building and maintaining the Miners' Convalescent Hospital, where the acquirement of this debilitated stage in the life of the individual is warded off by good food, rest, and judicious treatment.

Feeling deeply interested in the medical aspect of dynamite, and finding that imagination had assigned to it almost every case of disease that came before me, I resolved to go underground and inhale the gases resulting from the explosive decomposition. Captain Rich, of Wheal Uny, gave me every facility; and here I may mention how agreeably surprised I was at the care taken, in both Wheal Uny and East Pool, for the health of the men employed underground; currents of air circulate freely, save in a few ends where defect is unavoidable; and timber, in huge pieces, is being daily applied to the roof and walls of excavations, so as to prevent accidents by the falling in of ground.

V.—*John de Trevisa.*—A.D. 1342–1412. *(Supplemental Notice).* —JOHN J. ROGERS, *Penrose.*

Read at the Spring Meeting, May 16, 1873.

SINCE the publication of my brief notice of John de Trevisa, in the *Journal* of the Institution,* some additional light has been thrown on the subject by the discovery, through the Historical Manuscripts Commission, of further copies of some of Trevisa's works, and of entries in the books of the Colleges of Exeter and Queen's at Oxford, relating to his connection with that University.

In the "Computi," or Bursars' Accounts, of Exeter College, which commence as early as 1324, under the date 1362 John Trevysa is mentioned as a member. In 1364 the same Computus contains an entry of 12d. paid "for hire of two horses, when the Rector and John Trevysa were at West Wyttenham, to make composition with the farmers there for building a barn." *(Hist. MSS. Commission, 2nd Report,* 1871, pp. 128–9*).*

We next find him alluded to in the Computi of Queen's College. Here, in 1371–2, "among payments to the Fellows, it is stated that Trevisa (who had now removed to this College from that of Exeter) received half a mark and one penny." "Also for the expenses of Middelworth and Trevisa, in shewing the muniments of the church of Newbold at Strettone, and their charges on the road, 30d." In the Computus for 1372–3, the name of John Trevisa appears again as a Fellow; and again in the following year, 1373–4. From this date until 1395, no entry of his name is mentioned in the Report; but in the Computus for "the 19th of Richard II., 1395–6, we find that John Trevisa, though no longer a Fellow of the College, was paying 14s. 4d. yearly for a chamber which he rented there. In the Roll for the

* No. XI. April, 1870, p. 147.

22nd and 23rd years of the same reign, 1398–9, he is entered as still paying the same rent, it being stated there that this was only part of the amount which he had formerly paid," (pp. 140, 141).

These are the only entries relating to his personal history which I can find in the Reports of the Historical Manuscript Commission; and they seem to shew that Trevisa kept up his connection with Oxford by a partial residence there after his removal to Berkeley, for he dates his translation of *Higden's Polychronicon* as having been finished April 18th, 1387, at the request of Thomas, lord of Berkeley, whose Chaplain he then was, eleven years before the last payment of rent for his chamber in Queen's College. His translation of *Glanville de proprietatibus rerum* was finished, as he tells us, in 1398, "at Berkeley, on the 6th of February."*

With regard to Trevisa's scholarship, the following judgement is delivered by Mr. Hardy in the general introduction to Petrie's *Monumenta Britannica* (p. 4): "This translation by Trevisa is generally strict and literal, but sometimes confused, from a misapprehension of the author's meaning. Occasionally, short notices (to which Trevisa's name is prefixed) are inserted by way of explanation. On the whole, Trevisa appears to have been shrewd and well informed." And Professor Babington says of his translation of Higden: "As one of the earliest specimens of English prose, (A.D. 1387), containing many rare words and curious expressions, the version of Trevisa will be gladly welcomed by Philologists, who will not be over severe upon his errors."

It only remains to notice the additional manuscripts to which allusion has been made: Caxton's print of Trevisa's Higden, and the important reprint of that work together with the original Latin, which is now in progress.

And first, of Caxton. His well-known print of Trevisa's translation of the Polychronicon (A.D. 1482) is by no means an accurate rendering of it, inasmuch as Caxton thought it desirable, throughout the entire work, to substitute very many words and phrases of his own time for those of Trevisa which were then falling into disuse; so that although, to the philologist, a com-

* From the beautiful MS. in the library of Mr. Tollemache, at Helmingham Hall, Suffolk.

parison of Caxton's print with an authentic MS. of Trevisa's translation is extremely valuable, as shewing the changes which the English language underwent in that interval of a century, the print gives a very incorrect notion of our author's diction. Caxton also, in a most unaccountable manner, gives the date of the translation as 1352 instead of 1378. In 1352 Trevisa was only 10 years old.*

A few words on the edition of Higden referred to in the last Note.

Higden's Polychronicon was the standard work on General History at our Universities, in the 14th and 15th Centuries, and is of great value as enabling us "to form a very fair estimate of the knowledge of history and geography which well-informed readers of that date possessed." (*Introd:* p. xlii).

Professor Babington estimates that more than 100 Latin MSS. of the work are to be found in England; yet, notwithstanding its popularity, intrinsic value, and the purity of its language, it has never until now been wholly printed in the original Latin.

The various MSS. from which this work is compiled are fully described in the Introduction to Vol. I.; but it is sufficient for our purpose to refer to those of Trevisa's translation, which are numerous. Two of the most perfect and beautiful of them have been selected, and are principally used by the editors, viz. (1), that which is considered by them as the Standard MS., a superb copy on vellum in the Library of St. John's College, Cambridge, of which a *fac-simile* leaf is given at the commencement of Vol. I; and (2), that which was formerly in Archbishop Tenison's Library, and was purchased in 1861 for the British Museum, where it is now marked as No. 24,194. A *fac-simile* leaf of this is also given in Vol. II. Professor Babington gives good reasons for considering both these MSS. to have been written only a few years later than Trevisa's translation (1387), and he says that "the orthography is substantially the same in both the MSS."

A *fac-simile* leaf is also given, in Vol. I., from the *Harl. MS.* n. 2261, which contains the more recent English translation, now first printed. The author of this is unknown; but the date

* See *Polychronicon Ranulphi Higden*, published, under the direction of the Master of the Rolls; Vol. I, by Professor Babington, 1865. et sqq. ann. Introd: p. lxii.

attributed to it is about 50 years later than that of Trevisa's, and therefore intermediate between it and Caxton's print of the latter.

A Table of specimens of the alterations which Caxton introduced is given at page lxiv of Professor Babington's Introduction.

Lastly, since my former notice of Trevisa was printed, the following additional MSS. have been brought to light:—

1. A work of Trevisa's, previously unnoticed, viz., "*Nichodemus' treatise on the passion of Christ*," which is to be found in the British Museum, Shirley's MSS., Additional, 16,156, mentioned by Mr. J. Rawson Lumby at p. xxviii of his Introduction to Vol. III. of the Master of the Rolls' Edition of Higden; and, (2) the following MS. copies of books already noticed; viz: two MSS. of Trevisa's translation of Higden, in the British Museum; the older one being that of Cotton MS. Tiberius, D. VII. in quarto, on vellum of 296 leaves, slightly illuminated, but injured by fire, and attributed to the close of the 14th century. It contains also the dialogue of Dominus and Clericus, and Trevisa's Epistle to Lord Berkeley. The other MS. is Harl. 1900, of the 15th Century. See Babington's Introduction to Vol. II of his edition, page xxxviii. Another MS. copy of Trevisa's translation of Higden was discovered, by the Historical MSS. Commission, in the Hunterian Museum of the University of Glasgow, folio, on vellum. (*3rd Report*, p. 424).

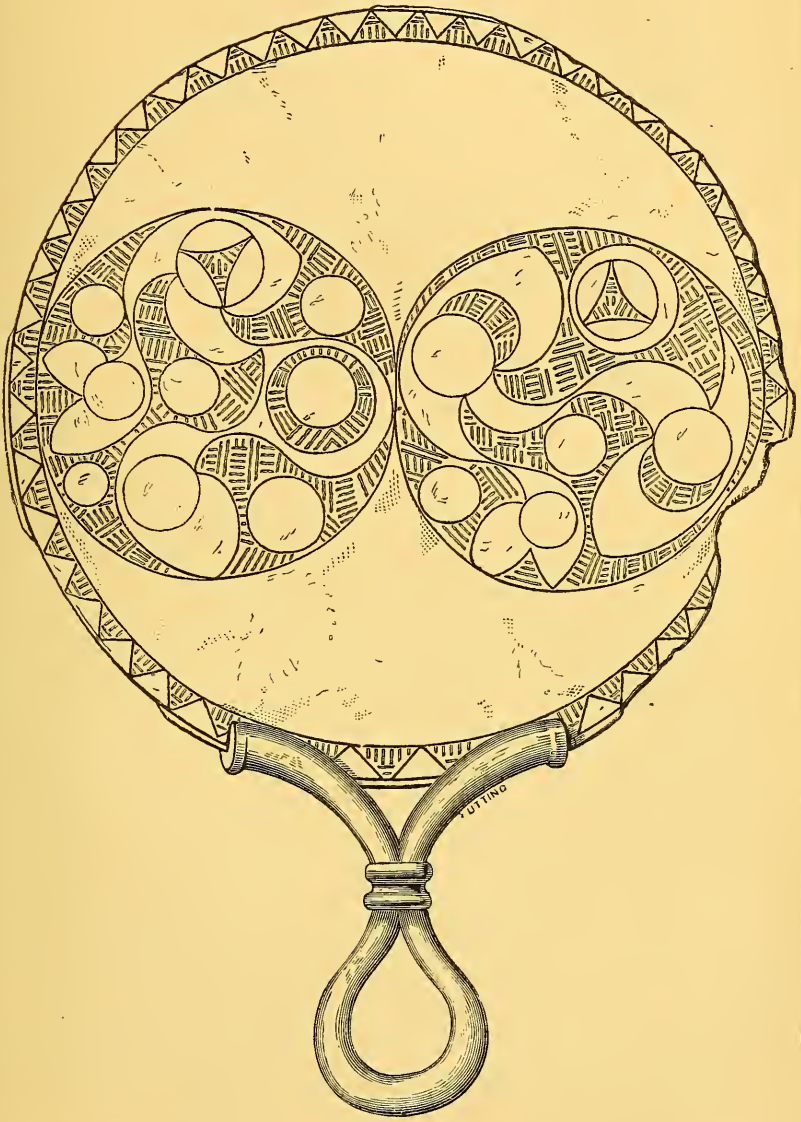
Those who are curious about the various readings in these interesting MSS. are referred to the valuable edition of Higden already mentioned, Vols. I. II., Introd., and to the Reports of Hist. MSS. Commission.

VI.—*Romano-British, or Late Celtic, remains at Trelan Bahow, St. Keverne, Cornwall, found about* 1833.—*By* J. Jope Rogers, *Penrose.*

BY the kindness of Mr. Edwards of Helston, I am enabled to record a small, but interesting discovery made on the Estate of Trelan Bahow, in the parish of St. Keverne, in this county, about 40 years ago, but unpublished until now.

So long ago as the year 1833, Mr. Samuel James, the then freeholder of the Estate of Trelan, had occasion to cut a new road, in extension of one already existing, through a large field called The Bahow.* In the course of the work, he came upon several graves situated in a sheltered place, on a northern slope of the land near the southern margin of Goonhilly Down. Mr. James died in America in 1865; but Mr. Edwards, who was employed by him professionally in selling the estate, subsequently to the discovery of the graves, relates that he was informed by Mr. James that they were two or three feet below the surface of the ground, and lay in a group together. Each grave was formed of six stones set on edge, two at each side, and one at each end, besides the covering stones: and they lay in a direction nearly East and West. In one of them was found a very perfect mirror of bronze, together with several beads of vitreous substance, and some rings of brass strongly gilded, some in a perfect state, others fragmentary, with other bronze articles, such as parts of fibulæ, &c., all apparently personal ornaments, and probably indicating the interment of a female; there were also several implements of hard iron-stone. Several of these relics were dispersed at the time, for want of knowledge of their value, and they cannot now be traced; nor can I learn that any record of them was published even in the

* Bahow, according to Dr. Borlase, Pryce, and Revd. Robert Williams, is a plural noun, signifying door- or gate-hinges. Trelan, in Cornish, is furzy place.



Bronze Mirror, found *circa* 1863 at Trelan, St. Keverne, Cornwall, in a stone grave, with beads, armlets and other personal ornaments.

Scale, Two-thirds of Original.

newspapers of the time. Those which survived were given to Mr. Edwards, who generously placed them at my disposal, and I have since, with his sanction, added them to the National collection of antiquities in the British Museum. The mirror is an object of great rarity; it is circular in form, six inches in diameter, with a well-formed handle which projects $2\frac{1}{2}$ inches from its edge. Mr. Edwards informs me that when it was found, one side was quite brightly polished. The whole mirror is now richly covered with ærugo, but a portion of the polished surface is still discernible. Both front and back are perfectly flat, and although the plate is very thin, it has no appearance, as some have, of having been furnished with a strengthening rim. Around the margin of the back an ornament is delicately punched: it consists of the repetition of a small triangular figure, $\frac{1}{4}$ of an inch in height, whose united bases form one circle, and whose apices touch another circle close to the outer edge. The effect is that of a frilled vandyke ornament around the entire circle of the mirror; the central space within this frilling is partially occupied by two circles, placed side by side as the mirror is held in the hand, leaving the spandrils above and below quite plain. These two circles are irregularly filled with discs and curves of various diameters; the spaces between them being occasionally hatched with the impression of a punch, somewhat similar to that used in the marginal frilling; some of these punch-marks precisely resemble those represented as occurring on the back of a bronze mirror found in 1863 at Stamford Hill, near Plymouth, and figured in *Archæologia*, vol. xl, 502, *plate*, *fig.* i. The handle is cast in the form of a loop, whose expanded ends are grooved for the insertion of the edge of the mirror. The workmanship is excellent, and its condition nearly perfect. (See the accompanying woodcut).

A comparison of this Trelan mirror with others found elsewhere may be interesting. Five other distinct finds are recorded, viz., four in England, and one in Scotland; and although none of the examples resemble this in every respect, it can scarcely be doubted that the Trelan mirror belongs to the same period of art to which the rest are assigned by the best authorities.

1. The earliest in point of date is that which was found in the year 1763 by Revd. Bryan Faussett at Gilton, a Saxon Cemetery near Sandwich in Kent. It is figured in plate xiii of Mr. Roach

Smith's *Inventorium Sepulchrale*,* and described as having been found in a coffined grave about 3½ feet deep, together with remains of unburnt bones, glass beads, and remains of articles of personal use and ornament, both of brass and iron, from which it was concluded that the grave was that of a female. The mirror is thus described by Mr. Faussett, the finder: "it is of mixed metal, "flat and circular: it is very highly polished on one side: it is "near five inches diameter and somewhat convex on the polished "side; it is much injured by rust, but not so much but that one "may plainly see one's face in it." He then describes the handle which was found near it, but detached by a recent blow, and was the same length as the diameter of the mirror. The handle of the Gilton mirror is straight, and was either ornamentally turned in a lathe, or cast from a turned mould, and was grooved at its upper end for the reception of the edge of the mirror plate; it appears to have had no surface ornament and no rim. This and the following specimen are now in the Museum munificently presented by Mr. Joseph Mayer to the town of Liverpool.

2. This specimen was purchased in Paris by Mr. J. C. Robinson, as a Celtic or Gallo-Roman mirror; the place of discovery unknown: but Mr. Albert Way and Mr. Franks agree in considering it Celtic, from the ornamentation of its back. It is 6½ inches in diameter and has an ornamental handle (*Archæol: Journal, Vol.* xxvi, page 72).

3. This specimen is in the Museum of the Archæological Society of Bedford, and was found in the excavations for the Warden Tunnel of the Midland Railway, about six miles from Bedford. Mr. James Wyatt of that place informs me that when found it was broken into two parts, is 7¾ inches in diameter, has a looped handle 3¼ inches long; one side was polished, the other "presents," as Mr. Albert Way says, in his elaborate paper on "Bronze Relics of the late Celtic period," (*Archæol: Journal*, xxvi, p. 71), "one of the most typical examples of the trumpet-"shaped decorations hitherto obtained: it is wholly produced by "delicate zigzag work, executed with much delicacy and precision." "The disk.....is slightly kidney-shaped. The handle may have "been enriched with enamel." The site of its deposit is near places

* Privately printed, 4to, 1856, London.

where various Roman relics have been found. Mr. Franks adds, in the note to Mr. Spence Bate's paper referred to below, that it resembles in several respects the most perfect of the three mirrors next to be noticed, viz :—

4. A bronze mirror, and the handles of two other mirrors, found in the Spring of 1863, in a Cemetery, at Stamford Hill, near Plymouth, and fully described and figured by Mr. C. Spence Bate, F.R.S., in vol. xl of *Archæologia*, pp. 500–510. The graves, which are considered as Romano-British, were dug about four feet deep in the soil and slaty rock, and contained, besides the fragments of mirrors, some bronze fibulæ, armlets, and other ornaments, with glass and pottery chiefly fragmentary, remains of unburnt human bones, and some iron implements, too much decomposed to be capable of identification. A solitary Roman coin appears to have been subsequently found near the site of the Cemetery, but not sufficiently near the graves to justify any conclusion as to their date. The coin is a defaced 2nd brass of Vespasian, (A.D. 69–79). *Ibid*, p. 510.

Mr. Franks adds, in his note, that in 1832 a considerable number of British coins were also found on Mount Batten, near the Cemetery; but the mirrors were probably unconnected with them. (See *Numismatic Journal*, vol. i.)

I extract, from Mr. Spence Bate's description of the more perfect of the Plymouth mirrors enough to illustrate its strong resemblance to that of Trelan, and others :—

"It was found lying flat at the bottom of the eastern extremity "of a grave. It was nearly circular in form, rather wide than "deep, (pl. xxx, fig. 1). The front or polished surface was placed "downwards. The back was ornamented with engraved scroll-"work, as may be seen in the plate.—In order to bring out more "strongly the design, some portions of the engravings were filled "in with numerous short striations, somewhat like basket work. "The mirror was surrounded by a narrow border or rim, formed "of a separate piece and folded over the margin."

This mirror had no handle remaining; but a second mirror, apparently similar, had a handle attached to it (fig. 3) very closely resembling the handle of that from Trelan; whilst the striated filling up of some of the insterstices of the curves of ornament on the back are so like those of the Trelan specimen, that they

might have been punched by the same tool. The Plymouth looped handle is four inches long; another handle was also found of a more finished character, being ornamentally turned, as the Gilton specimen is; but differently terminating in a strong oval ring.

5. The only remaining specimen to be noticed is that which is preserved in the Museum of Scottish Antiquities. It was discovered with other bronze relics in a moss in the parish of Balmaclellan, Kirkcudbrightshire, and is figured by Dr. Wilson in his *Prehistoric Annals*, (vol. ii, Edit. 1863, p. 228), and is thus described by Mr. Franks, in his note on Mr. Spence Bate's paper already cited:—

"A mirror of slightly elliptical form (greatest width 8¼ inches) "with plain back, a marginal rim, and a broad handle. The por- "tion of this handle joining the mirror is ornamented with "scrolls in relief; the lower end is decorated with pierced work. "*Proceedings of the Soc: Ant: Scotland*, vol. iv, p. 294; and *Sculptured* "*Stones of Scotland*, vol. ii, p. 10." Mr. Franks adds:—"I should "be therefore disposed to attribute the mirrors from Plymouth, "and the others which I have described, to a late Celtic origin. "The only other mirrors with ornamented backs are Etruscan; in "their elliptical form the specimens under consideration are not "altogether unlike Egyptian mirrors."

With respect to the probable date of this and similar relics, Mr. Albert Way agrees with Mr. Franks in the belief expressed by "the latter in his *Horæ Ferales*, that they are probably not "more ancient than the introduction of coinage into Britain, from "200 to 100 B.C. and not much later than the close of the first "century after Christ, when the Roman dominion in this country "was firmly established. This date would account for the occa- "sional discovery of such remains with or in close proximity to "Roman antiquities, and also for that influence that their designs "seem to have exercised over certain phases of Roman colonial "art, in which, however, their wild and studied irregularity of "design are brought into subjection, though at the same time the "patterns lose much of their charm and originality."

A few words will suffice to mention the only other relics found with the Trelan Mirror.

1. Glass Beads.—Two only of these remain. Each about seven-eighths of an inch in diameter, the perforation three-eighths of

an inch; one is of the deep blue paste similar to that of which the celebrated Portland Vase is made; the other striated, black and grey.

2. Rings of Brass.—Two of these remain entire, and are of $1\frac{7}{16}$ and $2\frac{14}{16}$ inches external diameter respectively; the latter is made of metal of the uniform thickness of $\frac{1}{4}$ inch on the plane of its diameter; the other rather stouter, and of unequal thickness. Fragments of similar rings were also discovered.

3. Various bronze articles of personal use or ornament, of which nothing remains but two portions of fibulæ.

4. Stone Implements.—These have unfortunately been lost, but Mr. Edwards remembers that several were found, and he had more than one of them in his possession for some years. His recollection of them is that they were of the form of the wedge and hammer; the former of these may have been mutilated stone axes, such as frequently occur in West Cornwall.

It may be asked what bearing have these Trelan relics upon the argument lately raised by Mr. W. C. Borlase, in his *Nœnia Cornubiæ*, in favour of the Roman date of many of our early Cornish interments. It seems impossible to conceive that specimens so skilfully and artistically wrought and finished as these from Trelan could have been produced at a period anterior in date to that of the usual stone and bronze implements, or of the rude pottery found at Morvah Hill. The most recent date, however, which the best authorities assign to these late Celtic relics, corresponds with the establishment of the Roman occupation of England; whilst therefore there is abundant evidence of Roman and even Saxon interments within tumuli and other burial-places of acknowledged earlier British date, affording frequent opportunity for the mingling of Roman and Saxon coins and other relics with those of undoubted earlier periods, it seems to be quite contrary to all archæological experience that the art manufacture of a nation should suddenly and within the limits of historical records be found to become so deteriorated as the change from the quality and beauty of the Trelan relics to the rude simplicity of the most perfect palstave or funeral urn. Yet nothing less than this seems to be involved in the argument referred to.

VII.—*Chronicles of Cornish Saints.*

VII.—S. Crantock.

By the Reverend John Adams, M.A., *Vicar of Stockcross, Berks.*

Read at the Spring Meeting, May 18, 1872.

IF a history had been handed down of the introduction of Christianity into Britain, it would have told us that the chief agents in the work were certain native families, in which the seed of the Gospel had first taken root; and that when the individual missionary from beyond the sea, or the little band of strangers who first scattered the seed, had done their work and gone to their rest, zealous teachers emanated from those few converted families, and proclaimed salvation far and wide to their countrymen. Such was certainly the character of the earliest missionary agency in the British Church. We know not who first brought the Gospel message to our shores; but we can point to a goodly company of native believers, who became the heralds of that message; and the more the fragmentary records and traditions concerning them are investigated, the more apparent it becomes that they were for the most part either related to each other, or associated as fellow-labourers under the same Christian teachers. Thus, *e.g.*, of the Saints whose Lives we have endeavoured to trace in previous Numbers of the *Journal*, Samson and David were companions at the College of St. Illtyd; Constantine was a pupil of David at Menevia; Cuby and David were cousins; whilst Petrock, we have reason to conjecture, was the instrument of Constantine's conversion, and an associate of Samson.

The holy man whose memoir we shall now attempt to compile, seems to have been related to David and Cuby, and to have been a link between the Welsh and Irish missionaries. He is called Cairnech by the Irish, and is styled, in their martyrologies, a

Cornishman.* By the Welsh he is claimed as the son of one of their chieftains, and is known as Carannog; and by the mediæval hagiologists his name is given as Carantocus. There is in the Library of the British Museum an old MS. Life of the Saint, supposed to have been written by John of Tynmouth; from which we gather that he was the son of Keredic, a chief who swayed the country of Keredigion, now Cardiganshire; and that when his father grew old and incapable of wielding the sword against the Scots, who at that time were devastating his territory, the elders of the people requested him to resign the sovereignty in favour of his son Carantoc, in order that they might have a leader who could go forth with them to repel the invaders. But war was not congenial to Crantock's taste; so he stole away with a wallet and staff, "following a dove which was sent by God to direct his course." At length he crossed over into Ireland, attracted by the fame of St. Patrick, who was then labouring there; and he became a zealous coadjutor of the great Irish apostle. Subsequently he returned to his own country with many companions, and lived some time in a cave, from whence he sailed down the Severn, and landed at Dindrarthon, where Cato (Cador(?)) and Arthur were living. Much the same account is given by Capgrave, Alford, Ussher, and the Salisbury Martyrology; but, as the earliest compilation of Crantock's life was made centuries after his death, those records of the legends which were current concerning him in the middle ages, would deserve but little credit, if they were not supported by other and more independent memorials. Several such may be adduced from ancient Irish and Welsh sources, which prove, beyond all reasonable doubt, not only that there was such a Cornish saint as St. Crantock, but that the above outline of his life is in the main correct.

I. As to his parentage. His family being Welsh, we naturally turn for information to the Welsh Pedigrees of the Saints; and

* In the Feilire of Aenghus—an account of the Festivals of the Church, written by Aenghus the Culdee at the end of the 8th Century,—his death is thus recorded: "The illustrious death of Carnech, the truly powerful;" and the following gloss is added: "*i.e.*, Carnech of Tuilen, in the neighbourhood of Cenannas (Kells), and he is of the Britons of Corn." (Cornwall). There is another Saint of the same name, who flourished in Ireland about a century later; and the two are sometimes confounded. The Feast Day of our Saint is May 16; and that of the other Carnech, March 28.

in them we find it stated that he was the son of Corun, the son of Ceredig, the son of Cunedda Wledig; but in an ancient manuscript* which gives an account of the family of Brychan of Brecknock, Crantock is stated to be the *son*, instead of the *grandson*, of Ceredig; in harmony with the legendary life above-mentioned.

II. With regard to his migration to Ireland and his association with St. Patrick, the following collateral testimonies may be adduced:—

When King Laoghaire and his nobles had professed Christianity, St. Patrick, we are told, determined that the Pagan laws should be reformed and brought into harmony with the Gospel. For this purpose, a Council of nine eminent men was formed, consisting of three kings, three bards, and three saints. The work which they compiled is still extant, bearing the name of *Senchus Môr*,† or Great Antiquity. Their names have been handed down to us, and amongst them, as one of the eminent saints chosen‡ for this important work, we find the name of Cairnech.—Again, as an indication of his ministerial work in Ireland, he is the patron saint of Tuilen, now Dulane, an old church and parish near the town of Kells, in the county of Meath. Hence we may infer that he had a mission station in that place; and, if we may give credence to the statement of John of Tynmouth, he must have been very successful in his labours, for we are told by him that the churches and cities in the region of Legenia were exalted under his name, and that he converted districts of Irishmen which were enchained by the superstitions of magicians, and was honoured by kings.

In one of the Topographical Poems of O'Dubhagin, written in the Irish tongue in the 14th Century, and published, with a translation, by the Irish Archæological and Celtic Society in 1862, there is the following obscure allusion to three *septs*, who are

* Vespasian A. XIV., printed in the *Acta Sanctorum*, 16 May iii, 585, from a transcript, with some additions, communicated by Dugdale.

† See Irish Nennius, Appendix, No. xxi, p. ci.

‡ "Laeghaire, Core, Dairi, the hardy;
Patrick, Benen, Cairnech, the just;
Rossa, Dubhthach, Ferghus, with science;
These were the nine pillars of the Senchus Môr."
Introduction to Senchus Môr, p. 17.

called the congregation of Cairnech, and who were probably British settlers at Dulane :—

> "The three septs of Tuilen without blemish,
> In Meath, though not Meathmen,
> Are the Tir-Eochain, distinguished among them,
> The Maini (and) the Britons of lasting fame.
> Early these men quaff their metheglin;
> They are the congregation of Cairnech."

Another incident may be mentioned, which shews how prominent and beneficent his position at Dulane must have been. In a collection of fragments of ancient historical manuscripts, preserved in the Library of Trinity College, Dublin, and known as the "Yellow Book of Lecain," it is said that* Muircheartach Mac Erca, monarch of Erinn, having been captivated by a Benshee, drove his queen and her children and her friends of the clanns of Conaill and Eoghain (the O'Donnells and O'Neills) out of the palace of Cleitech, on the Boyne, and that they fled to St. Cairnech, who took them all under his protection. "Thereupon," it is added, "the saint cursed the palace, and when the queen's friends departed to their own country, he gave them his blessing and appointed three insignia† for their war standards."

But further, we may trace the probable reason why Crantock

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* The original of the passage, with a translation, is published in Professor O'Curry's Lectures on the Manuscript Materials of Ancient Irish History; Appendix, C 1, *p.* 599.

† One of those insignia was the famous *Cathach*, or Book of Battles, a MS. containing a copy of the Psalms written by St. Columba. This precious relic was subsequently encased in a silver shrine, and was carried to battle by the O'Donnells even as late as 1497, to insure victory to their clan. Early in the last century it was deposited by Daniel O'Donnell in a monastery in Belgium, with a written injunction that it should be kept until claimed by the true representative of the house of O'Donnell. In 1816 it was accidentally discovered there by an Irish lady, who had been travelling on the Continent. On her return home she reported the circumstance to Sir Neal O'Donnell, the recognized chieftain of his name and race, and he at once sought and obtained the venerable treasure. His son, the present Sir Richard O'Donnell, of Newport, County Mayo, has placed it for Exhibition in the Museum of the Royal Irish Academy. The silver shrine or case has several dates and inscriptions on it, and seems to have been enriched from time to time. The document which it now contains consists of fifty-eight leaves of fine vellum, written on both sides in very ancient characters, with some slight attempts at illumination. All the leaves before that which contains the 31st Psalm are gone, and also the latter part of the Psalter from the 106th Psalm.

fled from his home, and sought refuge with St. Patrick, instead of leading his father's warriors against the Irish invaders. There is still extant an epistle written by St. Patrick to the soldiers of a chieftain called Coroticus, who was nominally a professor of Christianity, but who is said to have landed in Ireland at the head of a band of pirates, and, after committing every kind of outrage, to have carried off a number of baptized believers for the purpose of selling them as slaves to the heathen Picts. It is conjectured by Dr. Todd in his life of St. Patrick, that this chieftain was Ceredig or Cereticus, as the name is commonly given by Latin writers, the father of our saint; and the conjecture is strengthened by a statement in the life of Crantock, that Ceredig's territory was in his old age devastated by hordes of Irish. What else could have been expected but that fierce retribution would be sought by the half-civilized people whom he had so grievously wronged? And seeing that the great Irish apostle had terrified the soldiers of Ceredig by denouncing God's judgments upon them and their chief, stigmatizing them as "fellow-citizens of devils, and murderers of the brethren of the Lord," what more likely to have happened than that Crantock, being fully aware of the enormity of the crimes committed by his father's troops, and of the terror which the saint's scathing denunciation had struck into their hearts, should have fled for mercy to St. Patrick, rather than lead the guilty soldiers against the avenging host?

On his return from Ireland to his own country, he is said to have taken up his abode with many companions in a cave; and there is on the coast of Cardiganshire a church still bearing the name of Llangrannog, or the church of Carannog, which was founded by him. There is also, near a small harbour in the parish, a rock that bears some resemblance to a large chair, and is called by the native peasantry, *Eisteddfa Carannog.**

Concerning his subsequent career, we are told that, after crossing the Severn sea, he obtained a grant of land from king Arthur, near the port of Guellit, and built there a Church, which was called Carrun or Carrow. That Church was, no doubt, the building of which Leland† speaks when he says:—"Karantoc con-

* *Lives of the Cambro-British Saints*, p. 398.

† *Itin.* iii, 196.

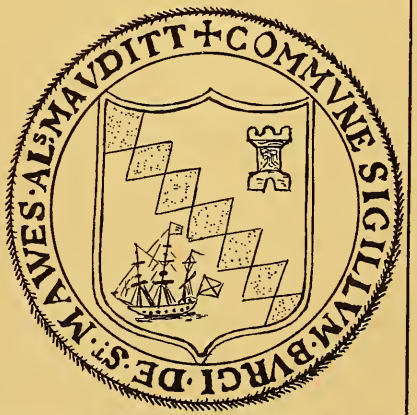
structed an oratory in a place which is called Guerith Karantauc;" and it probably occupied the spot upon which now stands the Parish Church of Crantock. There the saintly old man spent the evening of his life in planting the Church of Christ amongst the Britons on the Cornish Coast; and we may be sure, from the little that we know of his previous history, that he must have taken a prominent part in that great work. A man who, in early life, had for conscience sake renounced military glory and a sceptre, and who, as a soldier of the Cross, had won the highest mark of confidence and honour that St. Patrick could bestow upon him, must have been a Christian teacher of no ordinary zeal and power. How long he toiled and what he endured on that rugged and stormy shore, we know not; but thus much we know,—that the light, which he helped to kindle, is still burning after the lapse of twelve centuries, and that, although he sought not to win earthly renown, his name will live for evermore.

VIII.—*The Common Seals of Cornwall.*—*By* R. N. Worth, *Corr. Mem.*

Read at the Spring Meeting, May 16, 1873.

THE discussion of the origin of seals carries us back to the very earliest days of civilisation; for seals have been used for purposes of authenticity and security over a period to be reckoned by thousands rather than by hundreds of years. We find mention in Genesis of the seal of Pharaoh and the signet of Judah; and seals and their impressions abound among the antiquities of Assyria and Egypt. Indeed, so far as is known, they originated in the first-named country. Even gem engraving, to which we owe some of the finest remains of the elder art, was practised at Nineveh. And the cartouches which contain the royal name in the hieroglyphs of Egypt appear clearly derivable from the form of the royal seal. References to seals literally abound in the pages of ancient and classical writers. Pliny, who held without proof that the use of seals began with usury, speaks of their universal employment in his time, throughout the civilized world, as the sole means of authenticating documents, indicates their use for purposes of security, and regretfully exclaims: "O the innocence of the old world! what a heauenly life led men in those dayes when as there was no vse at all of seal and signet! But now we are fain to seal up our ambrie and hogsheads with our signets, for feare we be robbed and beguiled of our meat and drinke." He remarks likewise: "Verily we hold in these daies a seale to be the best assurance in contracts that may be."

Our own immediate predecessors—the Saxons—had, however, little to do with seals. Edward the Confessor had one, but the common practice was, instead of sealing, to make the sign of the cross. As legal formalities, seals were introduced into this country by the Normans; and, after the Conquest, they became what they still remain, component and necessary parts of nearly all legal documents. Originally they appertained only to corporate bodies



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W. LAKE, TRURO.

and persons of distinction. The seals of individuals are called personal seals; those of corporations, ecclesiastical and secular, are the common seals with which this paper deals. Sometimes a seal had both obverse and reverse; and in order to prevent falsification, counter or privy seals were introduced, which were at first put upon the backs of the large seals, but afterwards frequently used alone. In addition to the common seals of the abbeys, convents, and priories, abbots and priors had their personal seals; and in municipal corporations it was no uncommon thing for mayors to have, not personal, but official seals, appertaining to the dignity and handed on with the office, and distinct from the seal of the general body. Official seals retain their legal importance almost intact; and, to be valid, public acts of bodies corporate must be authenticated by the common seal, to show that they are the deeds of the corporation and not of any individual or individuals. There never was the same precision about the use of private as of common seals, although their importance was great in days when few could write; and now a days anything in the shape of a seal will answer the requirements of legal technicality where the deed is personal only. In mediæval times antique gems were often adopted as personal seals. Sometimes a seal was borrowed; and there is a deed to which the seal of the Priory of St. Germans is attached, because, as the executor says, it was better known than his. There has been occasional laxity concerning official seals. Thus the rector of a parish in Worcester, who claimed testamentary jurisdiction in the 16th century, used a seal of the customs of Exeter, instead of going to the expense of having one cut; and the seal of the corporation of Maidenhead was evidently at one time that of a private individual.

From gems to ivory, all possible materials have been used for the matrices of seals. Seals of the 12th and 13th centuries were commonly in lead; then different kinds of bronze and brass were employed, and frequently silver. Mediæval seals are generally large and elaborate. Secular seals are commonly circular; those of ecclesiastical bodies and females chiefly oval or of the *vesica piscis*—pointed oval—form. Occasionally we meet with the heater-shaped, the quatrefoil, or the lozenge.

The substances used for sealing purposes are more numerous than the materials of the matrices. Clay, *terra sigillaris*, cement,

metal, paste, and bees-wax were all employed before what we term sealing-wax,—really not wax at all but lac—came into use. Clay was probably first in order; and the mud of the Nile and the Tigris is said to have been admirably adapted for the purpose. In the days of Cicero, sealing earth was used in Asia, wax in Europe. Yellow wax, as produced by the bees, gave place to coloured about the end of the 12th century, and the colours most in favour were green and red. The wax was simply mixed with a little turpentine; and, perishable as the material may seem, I have seen seals in it 800 years old, as perfect as if impressed only yesterday. Paste or wafer is of later origin; and sealing-wax was not introduced into Europe until early in the 16th century.

Seals are attached to the documents they authenticate in two ways—either they are affixed to the face, or they are suspended by a strip of parchment or a string of some kind. All the early French Kings, to Louis le Gros, affixed their seals. The seal of Edward the Confessor, on the contrary, was always appended; and seals were not affixed, in England, until the 14th century. The leaden seals attached to the Papal decrees—*bullæ*—whence these documents take their name of bulls, were always appended; and similar seals were used by the Knights Hospitallers. Seals now are generally affixed *en placard*. The Great Seal of England may be seen, however, attached to patents, in a tin box; and some other official seals are always appended.

Stamps, as distinguished from seals, are coming increasingly into use. Pliny records that the Asiatics used to smear their seals with ink, and stamp them on the paper or parchment. This method is followed by the Post Office, by various courts of law, and by some recent incorporations—Newquay Local Board to wit. The great rival of the seal proper is however the embossing press. When seals were only used on rare occasions it was of very little consequence whether wax was used or not; but now when our Town Councils and Local Boards issue sealed notices by the hundred, some more expeditious way is needed. Some skill, moreover, is required in taking the impression of a large seal in sealing-wax, especially one so large as that of the Bridge Trust at Barnstaple—the largest in the Two Counties, and as big as a small saucer. And where the embossing press has not superseded the seal, the impression is frequently taken on wafer covered with

paper or membrane; whilst in other cases woodcuts of a seal are attached to the documents by gum, and formally acknowledged by having the seal placed upon them. I have read somewhere that in early times royal seals used to be additionally authenticated by the inclosure, in the wax, of a hair from the King's beard, but that as time went on and charters multiplied the depilatory process became so rapid that it had to be stopped.

Great importance has always been attached to the safe custody of official seals. The mere delivery of the great seal of England constitutes the Lord Chancellor. The Chancellors of France, from which country we derive much of our practice, were bound to see that they did not attach the seal to royal orders which were inconsistent with law or justice. The seals of ecclesiastical establishments were generally kept by the heads of the fraternities. Those of the municipalities of Cornwall are chiefly in the custody of the Mayors. So far as I am aware, this is peculiar. In Devonshire and elsewhere the Town Clerks are the usual custodians.

In the ensuing pages will be found a description of the seal or seals of every existing municipality in the county, and of those of all the extinct corporations, whether ecclesiastical or secular, of which I have been able to find any trace. With one exception, the whole of the secular seals are described from actual inspection; the materials for the account of the conventual seals are necessarily nearly all second-hand. The legends of the seals described from personal observation are given in capitals or black letter and as nearly representing, in pointing and other peculiarities, the originals, as type will permit. The legends of the seals for which I am indebted to various authorities are distinguished by being in small capitals. The illustrations to this paper include drawings, as nearly as possible in *fac simile*, of the seals of such boroughs—having them—as are now extinct. Failing to find, when the work was first undertaken, any traces locally of seals connected with the disfranchised boroughs of Callington, Michell, and Newport, the indentures of return at the Public Record Office were inspected; and it was then found that these places never had any.

The dates of incorporation given are chiefly those of royal charters. Feudal lords exercised, and that somewhat freely, powers of enfranchisement in relation to the little communities

that sprung up upon their estates. Therefore to trace the origin of popular rights we should have to go back to very much earlier dates than most of these quoted. If we find a borough with a parliamentary representation hundreds of years before it received a royal charter, we are not to assume that it had then no powers of local self-government. Some such powers, in fact if not in name, were exercised in feudal times at courts-leet and courts-baron, although manorial courts and portreeves are now but shadows of their former selves. Many of the places to be mentioned are corporate no longer, although their glory has not so long departed as that of Crafthole, Stratton, and Boscastle, which once had a claim to be included in the list.

The majority of the seals of the religious houses are of the thirteenth and fourteenth centuries, seeing that they were suppressed in the sixteenth. Among the municipalities the oldest seal is clearly that of Bodmin. No other appears to be earlier than the 16th century; there are several of the 17th; and others of even later date. In some corporations new seals, generally on the pattern of the old ones, were provided at the time of passing the Municipal Reform Act. All the municipalities had seals; it is only some of the unincorporated parliamentary boroughs—and not all of them—that were without.

Of late years a number of Local Boards have been formed, the seals of which have no claim to be included in the general list; but the devices of some of them are worthy of note. Thus the Falmouth Local Board has the 15 bezants and the triple plume; that of Hayle a rude steamer, in allusion to the connection of the port with early steam navigation; Newquay, a pilchard; Phillack, the interlaced triangle with floriated Greek cross; Padstow, the device of the extinct corporation—a ship; St. Austell, a tricusped trefoil, bearing a crown, the triple plume, and the county arms; St. Columb, the 15 bezants surmounted by a bird.

The list is as follows:

BODMIN.

Borough.—Bodmin was incorporated in the reign of Henry II; and has sent representatives to Parliament since 23 Ed. I. The present seal is ancient; but not so old as the earlier date. Vesica shaped, $1\frac{5}{16}$ in. × $1\frac{5}{16}$. Device: a king seated. Legend: SIGILL. COMVNE BVRGENSIVM BODMINIE.

PRIORY.—Dr. Oliver describes ["Monasticon Exoniensis" p. 17; also figured] the seal of this establishment as displaying two elaborate canopies. The right niche occupied by the Virgin, with child on her right arm: underneath S. MARIE. The left niche by St. Petroc, his right hand raised in benediction, his left holding a crosier: underneath S. PETROC. In a square recess beneath, a shield charged with fish, which Oliver suggests are dolphins and allusive to the arms of Bishop Bartholomew, one of the founders, but which are really three salmon, the arms of the Priory. Legend. SIGILLŪ. COIE. PRIORATUS. SANCTE. MARIE. ET. SANCTI. PETROCI. DE BODMYN.

ST. LAURENCE DE PONTEBOY.—The matrix of the seal of this ancient leper-house, the remaining revenues of which are now enjoyed by the Royal Cornwall Infirmary at Truro, is in the possession of Mr. J. B. Collins, of Bodmin, to whom it was given by the late Mr. Bray, for many years town clerk of that borough. It is vesica-shaped, 2 in. × 1¼ in., and represents St. Lawrence with gridiron under a gothic canopy; beneath is a leper kneeling. Legend S ✠ SCI: LAVRENTII BODMONS̄ DE: PENPOY.

CALLINGTON.

This is one of those parliamentary boroughs, which had neither corporation, arms, nor seal; although it still possesses a portreeve. It was represented from the 27th Elizabeth until the fatal year 1832.

CAMELFORD.

BOROUGH.—According to Browne Willis, this was one of the boroughs incorporated by Richard, King of the Romans. It was first authorized to send parliamentary representatives by Edward VI; but did not receive a municipal charter until 25 Charles I. Its arms—a camel passing a ford, all proper—are a canting allusion to its name, which however has nothing to do with camels, the word in Cornish simply signifying crooked: so that the Camel river is the crooked river. The seal, which is circular, 1⅜ in. diameter, bears the camel and ford. Legend * SIGILLVM* VILL: DE* CAMILLFORD.

COUNTY.

The county seal is oval. Device, a crown over a rose. Legend SIGILL COM CORNUB.

CRANTOCK.

COLLEGIATE CHURCH.—["Monasticon" p. 54] Seal of dean, small. Device, a bishop mitred, in act of blessing; in his right hand a long cross. Legend: SIGILLVM. PPOSITI. KARANTOCI.

FALMOUTH.

BOROUGH.—The town was incorporated 1661, and the seal dates thence. Circular, $1\frac{3}{8}$ in. diam. Device: a double-headed eagle displayed (the arms of the Killigrews, lords of the manor, now represented by the Earl of Kimberley) charged with a rock on the body, and a castle on each wing. Legend ✠ FALMOVTH.

FOWEY.

BOROUGH.—This ancient seaport, which sent more ships to the siege of Calais than any other place in the kingdom, was first represented 13th Elizabeth, and thence until 1832. Its municipal incorporation did not however take place until the reign of James II; and its municipal privileges did not long survive the downfall of its parliamentary prestige. The seal is in the possession of the Rev. Dr. Treffry, of Place, whose family have been for many centuries lords of Fowey. Circular, $1\frac{3}{8}$ in. diam. Device, a shield bearing a three-masted man-of-war, on the sea, sailing. Legend: SIGILLVM. OPPIDI: DE: FOWY: ANNO: DOM: 1702. The date is put within the border, over the shield.

GRAMPOUND.

BOROUGH.—There is quite a choice of authorities on the question of the first enfranchisement of this once notable borough, for which in the 17th century John Hampden sat, and which in the 19th was specially disfranchised for its corruption. Camden* avers that it was enfranchised by Edmund, Earl of Cornwall; Browne Willis† assigns the first recognition of its liberties to John of Eltham; Lysons‡ states that it existed by prescription. All however agree that it was one of the parliamentary boroughs of Edward VI. Its municipal privileges have departed with its parliamentary, and its seal is now in the possession of Mr. Josiah

* "Britannia," p. 18.
† "Notitia Parliamentaria," vol. iii.
‡ "Cornwall," p. 71.

Croggon. Circular, $1\frac{3}{4}$ in. diam. Device: a two-arched bridge over a river. On the bridge, the masonry of which is distinctly marked, an escutcheon with the Duchy arms, a lion rampant within a border bezanty. On the right the road over the bridge is shown; on the left bank of the river a tree. Legend: * SIGILLVM: MAIORIS. &. BVRGENSIVM: BVRGE. DE GRANDPONT. ALS: PONSMVR. The bridge of course refers to the assumed derivation of the name of the town from Grand Pont. The introduction of the Duchy lion bears out both Willis's and Camden's statements, so far as they agree, that is, in attributing the enfranchisement to an Earl of Cornwall.*

HELSTON.

BOROUGH. — Helston has returned representatives to Parliament since the 23rd Ed. I. It was made a municipality by Elizabeth. The present seal, which is circular, $1\frac{9}{16}$ in. diameter, has for its device, St. Michael killing the dragon, on the battlements of a castle, or it may be, church (Helston church being dedicated to the archangel). Michael has on his arm a shield charged with three lions. Legend: THE SEAL OF THE BOROUGH OF HELLESTON. Lysons ["Cornwall" cxxxvi] figures an older seal with the same device, but with the legend [black letter]: SIGILLVM COMVNITATIS VILLE DE HELLESTONE BURGTH.

LAUNCESTON.

BOROUGH.—This ancient town, though not incorporated until 1555, has sent representatives to Parliament from 23rd Edward I. The present seal is circular, and contains simply the arms of the town, with no legend. In the latter respect the modern seal of Truro is the only one in Cornwall that resembles it. The arms are: *Gules*, a triple circular tower in pyramidal form *or*, the first battlements surmounted by cannon of the last. A border *azure*, charged with eight towers domed, *ar.* Crest in a ducal coronet *or*, a lion's head *gules*, between two ostrich feathers *argent.*† Browne Willis‡ terms the towers on the border, tents. There are imperfect impressions of older seals in the Museum of the Royal Insti-

* The MUR in Ponsmvr are conjoined.
† Berry's "Encyclopædia Heraldica."
‡ "Notitia" v. iii, p. 7.

tution. One shews a castle with central tower embattled, and lower ones on each side, domed. The legend is defaced but SIGILLVM . . . . . CORNVB can be deciphered. There is another legend on each side of the castle in the field, apparently PRINCEPS CARO LAN. The other and still older one bore the triple castle without the inner legend; and the other letters are imperfect.

PRIORY.—Circular $1\frac{5}{8}$ diam. Device: a rude church with central tower. Legend: SIGILLV̄. ECCLE. SCI. STEPHANI. DE. LAN· This is figured by Oliver ["Monasticon," p. 23.] The impression attached to the surrender is perfect so far as the device goes, but the legend is defective.

ST. LEONARD LEPER HOUSE.—This leper house was removed from Launceston to Gillmartin ["Monasticon," p. 22]. The seal figured by Lysons ["Cornwall," p. cxxxv] is vesica shaped; Device, St. Leonard half-length under a Gothic Canopy. Legend: SIGILLUM HOSPITALE SCI LEONARDI: DE INTAQVVS (?).

LISKEARD.

BOROUGH.—This borough has been represented since Edward I. and apparently was chartered even earlier. Seal vesica-shaped, 2 in. × $1\frac{3}{8}$ in.; Device: a fleur de lis; two birds upon the arms, two annulets over; below on each side a feather. Legend: [a rose] SIGILLUM. COMMVNE. BVRGI. DE. LISKEARD. This is a modern reproduction of an older seal which was produced at the Herald's visitation in 1573. The birds are there described as martlets; Browne Willis erroneously terms them Cornish choughs.

LOOE, EAST.

BOROUGH.—East Looe, in conjunction with Fowey, sent a shipowner to a council at Westminster in the reign of Edward I, but was not entrusted with the privileges of Parliamentary representation until the reign of Edward VI; or incorporated municipally until the 13th Elizabeth. It ceased to be represented in 1832, but retains its corporate privileges. Seal circular, 1 in. diameter. Device: ship with two men on board; on the side of ship three shields charged with 3 bendlets, the arms of the once famous family of Bodrugan. Legend ✠ S': COMMVNETATIS: DE: LOO. [Figured Lysons "Cornwall," p. cxxxvi].

LOOE, WEST.

BOROUGH.—This borough rejoices in a multiplicity of names: Louborough, Portpigham, Portloo, Portuan, Westloo. First represented Edward VI, and incorporated by Elizabeth a few years earlier than East Looe; disfranchised like it in 1832, but, unlike it, having suffered the charter rights to expire, West Looe is now a borough no longer, and its insignia are scattered. Its seal is one of the most interesting in Cornwall, for it represents an archer of Elizabethan days fully equipped, holding his bow in his right hand and his arrow in his left.* It is oval, $1\frac{1}{16}$ in. × $1\frac{1}{2}$ in., and bears the legend ✠ POR* TV* AN* OTHER* WYS* CALLED* WESTLO. The lettering is badly done; the *w's* being double *v's;* one of the *s's* being reversed; and the *h* and *e* in "other" being conjoined. The earliest very perfect Cornish seal attached to an indenture of return in the State Paper Office is one for Portpigham of the 17th century.

LOSTWITHIEL.

BOROUGH.—This was a parliamentary borough from a very early date, and continuously returned representatives from 4th Edward II until 1832. First incorporated in 1623, its charter was renewed in 1732, when the present principal seal was given by the Recorder, Richard Edgcumbe. This seal is circular $2\frac{3}{8}$ in. diam.; Device: a castle standing on waves, therein two fishes swimming. The castle has central and side towers, each with three turrets, and all masoned. On each side is a thistle, and above, the date 1732. Legend: SIGILLVM BVRGI DE LOSTWITHYEL ET PENKNIGHT IN CORNVBIA. There is a smaller seal $\frac{13}{16}$ in. diam. with the same device, but with the fishes swimming to left instead of right. Legend: SIG: BVRGI DE LOSTWITHYELL.

Lysons figures ["Cornwall," p. cxxxvi.] an ancient seal, small, from a document of 3rd Henry IV. Legend: S. OFFICII DE MAOOR DE LESTIEL. A fragment of a larger seal than this is attached to an indenture of return, 17th century.

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* Berry, "Encyclopædia Heraldica," actually calls the archer a man habited as an Indian.

MILLBROOK.

Borough.—According to the old divisions Millbrook, near Mount Edgcumbe, was partly in Devon and partly in Cornwall. Browne Willis mentions it as once a borough, and Hals says that it sent members *temp.* Henry VIII, but was excused continuing on account of its poverty. There are no returns in the Public Record Office by which this may be tested; but I am indebted to Mr. Deeble Boger for putting me on the track of an evidence of former corporate life that cannot be gainsaid,—the corporate seal, the present holder of which styles himself the borough reeve. The seal is circular, $1\frac{1}{2}$ inches diameter; with a mill standing in a brook for a device. The brook runs through a woody country, and dogs are scattered among the trees. Legend: ✠ * SIGIL-LVM * DE * MILBROOKIA* This is the first time that the existence of this seal has been put upon record.

MICHELL.

Michell, *alias* Modishole, represented from the reign of Edward VI until 1832, never had either corporation, arms, or seal!

MARAZION.

Borough.—This little borough, the name of which has been the occasion of so much controversy, was incorporated by Elizabeth in 1595. It is said to have returned members. There are two seals with the same device, one of metal, and the other, of later date, of ivory. In other respects they are similar. Circular $1\frac{5}{16}$ in. diam. Device: a rude castle, with central and flanking towers. Legend: ✠ SIGILL. MAIORIS. VILLE. ET. BOROV. DE. MARGHASION.

NEWPORT.

Newport by Launceston, as Michell, never had either corporation, arms, or seal; though it sent members from Ed. VI to 1832. This borough, like Launceston, is occasionally called Dunheved. Indeed if Carew ["Survey," p. 90] is to be followed, and the earliest indentures of return, it would seem to have really the better right to the name.

PADSTOW.

BOROUGH.—Padstow had a corporation *temp.* Elizabeth;* but nothing is known of the date at which it became extinct. No impression of the seal is extant; but a drawing thereof is attached to a deed in the possession of Mr. C. G. Prideaux Brune, of Place, and the device has been adopted by the Padstow Local Board. It is a three-masted ship of war upon the waves, sails furled, and anchor at prow.

PENRYN.

BOROUGH.—Willis, Borlase, and Lysons disagree as to when Penryn was incorporated or its representative character commenced. No doubt it is an old borough, and the incorporation by James I of which the latter speaks, by no means the earliest assignment of privileges. Seal circular, $1\frac{5}{16}$ in. diameter. Device: on shield "bust of man in profile, couped at breast, vested over shoulder, wreathed about temples with laurel tied behind with two ribbons flotant."† Legend ✠ PENRYN. BURGUS. A smaller and more modern oval seal has the same device and legend. Carew gives Penryn as meaning "curled head," and possibly the device was intended to refer to this.

GLASNEY COLLEGE.—From the fragments attached to the surrender the seal of this body was probably vesica-shaped and 2 inches long, but the remains afford no clue either to device or legend.

PENZANCE.

BOROUGH.—This borough was incorporated in 1614. The seal is circular, $1\frac{1}{8}$ in. diameter. Device: the head of the Baptist in a charger. Upon a scroll under the head the words PENSANS ANNO DOMINI. Two figures of the date, 1614, are put on either side. Penzance has been interpreted to mean the holy headland; the head of the Baptist is clearly used as a canting device.

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* Carew "Survey," p. 87, speaks of the charter as newly purchased.

† See Berry, "Encyclopædia Heraldica."

SALTASH.

BOROUGH.—The municipality of Saltash dates back to the days of Richard, king of the Romans, whose arms are upon the existing seal. Its parliamentary representation continued from Edward VI until 1832. The seal is circular, 1⅝ diameter. Berry describes the borough arms as being azure, having in base water *proper;* in pale an escutcheon *or*, thereon a lion rampant *gules*, within a border *sable*, bezanty, ensigned with a prince's coronet of the third; on each side of the escutcheon an ostrich feather *ar*, labelled *or*. This is the device, although all the tinctures are not clearly shown. It is remarkable that the field of the duchy shield is generally given *argent;* it is shown however on a boss in Saltash Church *or*, as in the arms of the borough. Legend * SIGILLVM: SALTASCHE: IN: CORNWAILE. There was another seal bearing as a device a three-masted ship in full sail; but that has long been lost.

ST. BURIAN.

COLLEGIATE CHURCH.—Oliver states ["Monasticon," p. 7] that the last ungraceful seal of this Deanery was cut in 1717. It is oval in form, and the device a burlesque figure of Athelstan. Legend: SIGIL. PECVL. IVRISDIC. DEC. STÆ. BERIANÆ. 1717.

ST. GERMANS.

Like Callington and Michell, although entrusted with the electoral franchise (from the reign of Elizabeth until 1832), St. Germans had neither corporation nor arms, nor of its own a seal; the returning officer, as at the two other places named, being a portreeve. It was however customary to attach the private seal of the St. Germans family to the indentures of return, and I am indebted to the courtesy of Earl St. Germans for an inspection thereof. The seal is circular, 1⅜ in. diameter, and shews two ovals. The dexter one bears the arms of the family: *argent* a fesse *gules* between two double cottises wavy *azure;* the sinister oval—the monogram St. G. Above is the crest, an elephant's head *argent*, plain collared *gules;* beneath, a cherub; and on scroll, the St. Germans motto: PRÆCEDENTIBVS INSTA.

PRIORY.—Oliver ["Monasticon," p. 3] had seen but one impression of the seal of the priory, which represented the saint sitting. The only letters of the legend remaining were SCI.

ST. IVES.

BOROUGH.—The canting arms of St. Ives are "an ivy branch overspreading the whole field *vert;*" and this forms the device on the seal, borne upon an escutcheon. The seal is circular, $1\frac{5}{8}$ in. diameter; and the legend * SIGILLVM. BVRGI: ST. IVES. IN. COM: CORNVB: 1690. The borough was first represented in the reign of Mary, but incorporated by Charles I.

ST. MAWES.

The borough of St. Mawes was distinguished for having neither market, church, chapel, nor corporation. Its portreeve however was commonly dignified by the title of Mayor, and it had both arms and a seal. It sent members from the 5th of Elizabeth until 1832. The seal is circular, $2\frac{1}{8}$ in. diameter, and bears on an escutcheon in the field, the arms of the borough: *azure*, a bend lozengy *or*, between a tower in sinister chief *ar*, and a ship with three masts and sails furled in dexter base, of the second. Legend ✠ COMMVNE. SIGILLVM. BURGI. DE. ST. MAWES. ALs. MAVDITT.

ST. MICHAEL'S MOUNT.

PRIORY.—The seal of Richard Auncell prior from 1388 to 1412 bore a device, St. Michael transfixing the dragon ["Monasticon," p. 29]. It was discovered in Exeter about 30 years ago.

STANNARIES.

Carew ["Survey," p. 17], says that the ancient seal of the tinners bore an axe and shovel in saltire; but his reference is the only trace of its existence. In 1842, however, a leaden bulla was found in a field at Lee Down, Bath, which turned out to be a seal of the tinners of Cornwall, certainly not of a later date than the earlier half of the 14th century. The impressions on both sides are alike. On a diapered ground are a man working with a pick, and another with a shovell. Between them appears a lion's head which has been said to have been introduced as typical of running water necessary to the stream works. I would suggest however that it rather refers to the arms—the lion rampant—at first of the earldom and then of the Duchy. Legend ✠ S'. COMVNITATIS. STANGNATORVM. CORNVBIE. There is an electrotype of this highly interesting seal in the Museum of

the Royal Institution; which also contains an impression of the old seal of the Lord Warden of the Stannaries; and of a large seal of the customs of the Duchy of the 14th century. The seal of the Lord Warden resembles that at present in use. Circular, $1\frac{3}{16}$ in. diameter, device: a castle flanked by two towers, and with a curious fan-like embattled upper structure. In front of gate a lion couchant. Legend: SIGILL. DUCAT. CORNUB.

The customs seal has as its device the arms of "Henry Prince of Wales and Duke of Cornwall" quartering lions and fleur de lis. The matrix was purchased in 1824 by a brazier of Liskeard and was probably made in 1399 when Henry of Monmouth was created Prince of Wales ["Gent. Mag." 1825, pt. 2, p. 497.] The legend is S. henrici principis Wall' duc cornub & comit cestr' de officio coketti ducatus cornubie.

The tin coinage used to be performed by a hammer which bore on its face the arms of the Duchy—the well known lion rampant in a border bezanty.

TINTAGEL.

Borough.—Tintagel *alias* Dundagil, *alias* Bossiney, *alias* Trevena, dated its privileges from Richard, King of the Romans, but was incorporated and enfranchised by Edward VI. It ceased to be represented 1832, and the corporation did not long survive. Its insignia are now scattered; and the seal is in the possession of Mrs. Symons of Bossiney. It is circular, $1\frac{5}{8}$ in. diam., device: a castle standing on the sea, with steps descending thereto from the main entrance. Two towers flank this entrance, and there is a larger one domed behind; all connected by an embattled circular wall. Legend: ✠ SIGILLVM. MAIORIS. ET. BURGIENSIV' BVRGI. DE. TINTAOIEL.*

TREGONY.

Borough.—This borough sent representatives twice in the reign of Edward I, but then intermitted, as Browne Willis has it, until Elizabeth; from which date it continued to exercise the electoral franchise until it found a place in schedule A of the Reform Act. It was incorporated by James I, but is also denuded of that vestige of its former importance—a corporation. The seal

* The O instead of a G in Tintagel is apparently an Engraver's blunder.

is said to be in the possession of Dr. Jewell of Mylor, but my enquiries have failed to ascertain whether that is so or not. As figured by Lysons ["Cornwall," cxxxvi] it is small, circular, bears as a device the arms of the borough, a pomegranate seeded, slipped, and leaved; and the legend: SIGIL. COM. BURGO. DE. TRIGONI.

TRURO.

Borough.—Truro is an ancient borough, which, according to the Visitation of 1574, Harl. MSS 1079, was incorporated by Raynold Earl of Cornwall, base son to Henry I, formerly by Richard Lucy, als Lucam. Its first royal charter is said to have been given by Henry II, and it has returned members to Parliament ever since the 23rd Edward I. The present seal is circular, an inch in diameter and bears simply the arms of the borough —a three-masted ship of war on the waves, with a pennon of St. George flying from each mast and sail set on the main. In the water two fishes swimming to right one above the other—not as on the Lostwithiel seal, one in line with the other. The seal bears no legend, in this respect resembling that of Launceston; but an older and larger seal with the same device was inscribed SIGILLV COMMVNITATIS DE TRVRO.

Customs.—An old customs seal of Truro bears a crowned thistle with a feather on each side. Legend SIG TRVRO. MEM. DE. PORTU PLYMOVTH.

Dominican Convent.—The matrix of the seal of the convent of Dominican friars was found in 1842 in the garden of the vicarage house of Sturry, near Canterbury; and is now in the Museum of the Royal Cornwall Institution. It is a pointed oval $1\frac{3}{16} + 1\frac{2}{16}$, and represents the Saviour in the act of teaching and blessing. Legend: * S' ꝺVENT' FRATRV̄ P'DICATOR' DE TRIVERV.

TYWARDREATH.

Priory.—Oliver ["Monasticon," p. 36] mentions four seals of St. Andrews Priory at Tywardreath. First: St. Andrew bareheaded, holding staff surmounted with plain cross, in right hand —book in left.—Legend: SIGILLVM: SCI: ANDREE. Second: St. Andrew erect, long saltire cross in right hand; book in left.

Legend; SIGILLVM. SANCTI. ANDREE. Third attached to deed 1294. St. Andrew suspended on his cross; star on right side, fleur de lis and crescent on left. A similar seal varies in the absence of the latter. Fourth, 1436, St. Andrew with his saltire under a rich canopy, beneath him a monk in attitude of prayer. Legend: SIGILLV : PRIORIS. ET. CONVENTVS : ECCLIE : SCI : ANDREE : DE : TYWARDREITH. [This one Oliver figures]. One of the coats of arms assigned to the priory—*Gules*, a cross saltire *or* between 4 fleurs de lys of the second, has been adopted as the seal of the Tywardreath Highway Board. Thomas Collins, the last prior of the Priory, used as his personal seal an intaglio of the Laocoön, to which considerable interest attaches, seeing that it restores that celebrated group in a different manner to that which has been followed.

IX.—*A Calendar of Natural Periodic Phenomena: kept at Bodmin for the year* 1873.—*By* THOMAS Q. COUCH, F.S.A.

"Il semble, en effet, que les phénomènes périodiques forment, pour les êtres organisés, en dehors de la vie individuelle, une vie commune dont on ne peut saisir les phases qu'en l'étudiant simultanément sur toute la terre." —*Quetelet.*

N.B.—The names printed in *Italics* indicate plants and animals marked for special observation.

fl., means flowers; fol., foliates; defol., defoliates.

The time of flowering is to be noted when the flower is sufficiently expanded to show the anthers; of foliation, when the leaf-bud is so far open as to show the upper surface of the leaves; of fructification, at the period of dehiscence of the pericarp, in dehiscent fruits; and, in others, when they have evidently arrived at maturity; of defoliation, when the greater part of the leaves of the year have fallen off.

The Meteorological peculiarities of this year will be elsewhere treated of in the Journal, and will aid in showing some of the causes of the advancement or retardation of its Natural Periodic Phenomena. The time is not come for generalising on all our facts recorded, and the delay is even of advantage, in making generalisation more precise.

The significance of the comparative abundance or rarity of species in our yearly record cannot be over estimated, and in this I have been much assisted by my friends Mr. Richard Tellum, of Tregawne, and Mr. Richard Olver, of Trescowe. I cannot better illustrate the value of such facts collected by intelligent observers than by the translated words of Professor Quetelet:—"The phases of the existence of the minutest plant-louse, of the paltriest

insect, are bound up with the phases of the existence of the plant that nourishes it; this plant itself, in its gradual developement, is in some sort the product of all the anterior modifications of the soil and atmosphere."

The Swallow tribe, (Hirundines), visited us in remarkably small numbers; and in many of their accustomed haunts were very late in their arrival. The Cuckoo and Corncrake were scarce; Woodcocks, Snipes, Plovers, the migratory thrushes, Ducks, Teal, Widgeon, and other winter Natatores were very scarce. It is to be noticed that the Starling has become a settler amongst us, and has formed colonies at Trewordale, Bosnieves, and other places in the neighbourhood. Frogs, judging from their spawn, once so common in our pools, as well as their tadpoles, have for a time very much diminished in numbers.

Crops in the Bodmin District.

Hay was about an average, and on the whole pretty well saved—weather very fickle.

Wheat was much below the average, and, in consequence of the unusually wet harvest, much was injured by sprouting, midge, etc.

Barley was a good crop, above the average, but much injured by the wet harvest; very little in this district will do for malting this year.

Oats were a good average crop in some places, and, not being so easily damaged by wet as wheat and barley, were better saved.

Turnips made a good start, but were checked by the cold and rain of August and September; the mild Autumn has, however, helped them, and they are now an average crop, though not generally large in the bulb.

Potatoes were a fair crop, but much injured by the disease; in consequence of the excessive rain, the quality is not good.

Mangolds were an average crop.

Apples, a good crop, much above the average, but not full flavoured.

Hazel-nuts, a slight crop.

Plums, a very small crop.

Grass has been very plentiful in consequence of the excessive humidity.

Live Stock, in consequence of the plentifulness of grass, have done well, and have been remarkably free from disease, showing, I think, that a low temperature with moisture suits them better than the dry summers we had some years ago.

January 6. Wild Primrose, (Primula vulgaris), fl.
28. Cardamine hirsuta, fl.
— Man. Hooping cough, (Pertussis), prevails.
February 1. *Honey-suckle, (Lonicera Periclymenum), fol.*
24. *Pilewort, (Ranunculus ficaria), fl.*
March 11. *Elder, (Sambucus nigra), fol.*
19. Dog-violet, (Viola canina), fl.
— Wheatear, (Saxicola œnanthe), arrives.
20. Greater Stitchwort, (Stellaria holostea), fl.
23. Sulphur Butterfly, (Gonopteryx rhamni), seen.
— *Peacock Butterfly, (Vanessa Io), seen.*
— *Adder, (Pelius Berus), seen.*
25. Chaffinch, (Fringilla cœlebs), sings.
— Chiffchaff, (Sylvia hippolais), sings.
— *Larch, (Larix communis), fol.*
26. Skylark, (Alauda arvensis), sings.
27. *Whitethorn, (Cratœgus oxycantha), fol.*
— Germander Speedwell, (Veronica Chamædrys), fl.
31. *Lilac, (Syringa vulgaris), fol.*
April 4. *Wood-sorrel, (Oxalis acetosella), fl.*
8. *Swallow, (Hirundo rustica), seen.*
15. *Yellow Loosestrife, (Lysimachia nemorum), fl.*
— *Swift, (Cypselus Apus), seen.*
— Butterflies. Wood Argus, (Lascommata Egeria).
— *Large and small Cabbage, (Pieris brassicæ, et Rapæ).*
— *Birch, (Betula alba), fol.*
— Lady's-smock, (Cardamine pratensis), fl.
19. *Beech, (Fagus sylvatica), fol.*
20. Wild Hyacinth, (Hyacinthus non scriptus), fl.
22. *Cuckoo, (Cuculus canorus), heard.*
May 2. *Hazel, (Corylus Avellana), fl.*
5. *Lilac, (Syringa vulgaris), fl.*
— *Whitethorn, (Cratœgus oxycantha), fl.*

7. *Corncrake, (Crex pratensis), heard.*
9. Tormentil, (Tormentilla officinalis), fl.
— Bird's foot Trefoil, (Lotus corniculatus), fl.
— Tuberous Vetch, (Orobus tuberosus), fl.
10. *Bugle, (Ajuga reptans), fl.*
12. *Broom, (Spartium scoparius), fl.*
23. *Foxglove, (Digitalis purpurea), fl.*
— *Mountain Ash, (Sorbus aucuparius), fl.*
24. Tufted Vetch, (Vicia cracca), fl.
25. *Wild Guelder Rose, (Viburnum opulus), fl.*
26. Cockchafer seen.
27. *Elder, (Sambucus nigra), fl.*
30. Hay Harvest begins.
— Man. Mumps, (Cynanche parotidea), prevail.

June 1. Columbine, (Aquilegia vulgaris), fl.
2. *Honeysuckle, (Lonicera periclymenum), fl.*
6. Horsefly, (Œstrus equus), seen.
7. Dog-rose, (Rosa canina), fl.
— Spotted Orchis, (Orchis maculata), fl.
— Sedum anglicum, fl.
12. Blackberry, (Rubus fruticosus), fl.
— Silene inflata, fl.
13. *Wild strawberry, (Fragaria vesca), fruits.*
— Valerian, (Valeriana officinalis), fl.
— Tutsan, (Hypericum Androsæmum), fl.
14. Sheep's scabious, (Jasione montana), fl.

July 1. *Wild Thyme, (Thymus serpyllum), fl.*
2. Wood sage, (Teucrium scorodonia), fl.
— Potato disease appeared.
— Golden-rod, (Solidago virgaurea), fl.
3. Betony, (Betonica officinalis), fl.
4. *Millfoil, (Achillœa millefolium), fl.*
6. *St. John's Worts, Hypericum perfoliatum,* and *pulcher, fl.*
9. Centaury, (Erythræa centaurium), fl.
— Linaria vulgaris, fl.
— Meadow-sweet, (Spiræa ulmaria), fl.
10. Centaurea nigra, fl.
— Glow-worm seen, (Lampyris noctiluca).
26. *Mountain Ash, (Sorbus aucuparia), fruits.*

August 13. Blackberry, (Rubus fruticosus), ripens fruit.
14. *Swifts seen, but in diminished numbers.*
— Serratula tinctoria, fl.
20. *Devil's-bit Scabious, (Scabiosa succisa), fl.*
— *Elder, (Sambucus nigra), ripens fruit.*
28. Swallows, (Hirundo rustica), observed congregating.
September 7. *Sycamore, (Acer campestre), defol.*
— *Magpies congregate, (Corvus Pica).*
16. *Honeysuckle, (Lonicera Periclymenum), ripens fruit.*
October 10. *Aspen, defol.*
11. Periwinkle, (Vinca major), fl.
12. *Ash, defol.*
— *Birch, (Betula alba), defol.*
15. *Lime, defol.*
— *Beech, defol.*
17. *Woodcock, (Scolopax rusticola), shot at St. Wenn.*
27. *Starlings, (Sturnus vulgaris), large flocks seen.*
November 14. Narrow-leaved Elm, (Ulmus campestris), defol.
December 4. *Ivy, (Hedera Helix), fl.*
15. Golden Plovers seen, (Pluvialis Aurea).
25. *Snowdrops (wild), fl., (Galanthus nivalis).*
27. Sulphur Butterfly seen.

METEOROLOGICAL NOTES FOR 1873.

Taken as a whole the past year presents no very marked meteorological characteristic; its temperature and rainfall were not far from their average. The tabular statement may therefore be referred to for a general view of the results of observation, and such particulars as may seem to deserve notice will be most conveniently mentioned in a brief review of the several months.

January was very mild and wet till the 17th, in continuation of the weather prevailing through almost the whole of December. Afterwards it became colder and rather finer, but the temperature of the whole month was above the average. There were only six days on which frost or snow occurred. The total fall of rain at Truro was very little in excess, but the number of days on which more or less fell (25) was a good deal over the mean of 24 years (21·2). This statement applies nearly to the whole western district; but as will be seen on reference to the table of comparative rainfall, the amount in the east of the county, as exemplified by Bodmin and Altarnun, largely exceeded the average. The barometer ruled low, and the mean (29·46) was below that of any month; the absolute minimum (28·57 in.) was also the lowest point reached in the year. This was on the 20th, and Mr. Glaisher remarks that during the whole of that day the readings at the Greenwich Observatory, at 159 feet above sea level, were but little in excess of 28·3 in., this continued depression being almost unprecedended.

February was unusually cold throughout, its mean temperature being about 4° below the average, and nearly 5° below that of the preceding month. There were however but few frosts, and none very severe in the west. At Altarnun there were twenty-four, and snow fell heavily. Mr. Glaisher states that the decline of temperature from "January to February this year is the greatest of any (excepting only that in 1853), that has occurred in 102 years." Heavy gales occurred on the 1st and 25th, causing some losses at sea and on shore. The rainfall was much in excess of the average, although the number of wet days was below it, being only 15; but the quantity was large on several occasions—at Penzance nearly six inches fell on seven days. It deserves notice that the relations of the rainfall at some of the eastern stations to their averages for February differed from those of the western ones just in the opposite direction to what in occurred January. This was most marked at Altarnun, where the quantity recorded was more than an inch less than usual. The direction of the wind may probably account for this in great measure. I may here call attention to the generally large excess of rainfall at Poltair, about a mile from Penzance, over that registered in the town. The more elevated site of the former place would hardly explain the whole difference, which is interesting.

March requires little notice. The mean temperature was about 1½ degree above the average. There was only one frost, and the minimum was 27 degrees. For Penzance, Mr. Richards states that the thermometer had not fallen to 32 degrees since the 1st January. At Altarnun there were 18 frosts, and snow on 3 days. The rainfall was a good deal in excess of the average at all the stations, so was the number of rainy days in the west, but not in the east.

April was a fine month, with considerable range of temperature. The maximum at Truro was 68°, the minimum 27°. There were 4 frosts, and 3 other days on which hail fell. The night of the 26th was the coldest; and at Penzance, for the first time this year, there was "hard frost, blighting considerable quantities of early vegetables." The rainfall was very small, only half-an-inch at Truro, and proportionately at the other stations. Only twice, (in 1854 and 1861) has the quantity in this month been so small since our record began in 1838. The deficiency was less marked up the country.

May and *June* need little comment. The weather was fine on the whole, but rather harsh. The rainfall was about two-thirds of the average. Want of rain was felt in the eastward districts, springs and streams were very low, and vegetation backward. Basing his remarks on Greenwich, Mr. Glaisher writes:—"from the 22nd April, a long cold period set in, and the weather continued, with very few trifling exceptions, below the seasonable average till the 18th June; for this long period of 57 days, the deficiency of mean temperature was on the average 2¾° daily."

July and *August* may be taken together as on the whole similar. Their mean temperature was about the average, the first three weeks of cold being suddenly followed by hot weather; and subsequently cold and heat changed places at short intervals. The rainfall was decidedly in excess, especially in August, when the usual quantity was nearly doubled at Truro and the west, and even more than that at Altarnun, where 28 days were more or less wet, and 9·12 inches fell. This was disastrous for the farmers in these later districts; in the earlier ones, and in the eastern counties, much of the harvest was secured before the rain set in.

The same sort of weather prevailed through the first 20 days of *September;* afterwards it became fine and dry, and sometimes warm. The rainfall was not far from the average. Mr. Glaisher remarks that "the wind during the whole quarter was nearly always West, or a compound of the West with the South; the winds from the North and East were insignificant in duration." The crops of cereals were below the average in quantity and quality. Of fruits, apples alone were abundant, and proved sound for storage.

The first week of *October* was warm, the last very cold. The mean temperature of the month was more than 2 degrees below the average. The highest temperature was 72° on the 1st, the lowest 26° on the 28th, and there was frost on the five consecutive days from 26th to 30th. These days were, Mr. Tripp says, "unprecedentedly cold for the month" at Altarnun. The rainfall was about an inch less than the average at all stations.

November had its old characteristics, chilliness and gloom without severe cold; indeed the last fortnight was mild, and the mean monthly temperature was about 1 degree in excess. The rainfall was about the average generally; at Bodmin it exceeded it by about 1·44 inch, chiefly owing to the heavy fall of 1·60 inch on the 5th, which was local.

December was "remarkable for its excessive mildness, the absence of high winds, and especially for its very small rainfall." This is Capt. Liddell's summary for Bodmin, and it may be applied generally. The mean temperature was about 2½ degrees above the average for the month. There was fine frosty weather from the 9th to 13th; the minimum (9th) being 25°. This was, as Mr. Tripp remarks, "a pleasing contrast to the fog which enveloped the eastern and northern counties at that time." Mr. Glaisher observes that the 9th, 10th, and 11th, when the cold was very severe, "were distinguished in London by a most remarkable continuance of very dense fog. The fog of the 9th was darker in colour and more dense than I have ever known a fog or cloud to be before." The rainfall at Truro, (1·23 in.) was little more than a quarter of the average amount, and was the least recorded here for December during the last thirty years. The results at the other stations were similar. As regards the Greenwich Observatory, Mr. Glaisher states that "till the middle of the month there was no rain, and only a few showers fell subsequently, the total fall being only 0·3 inch, and less than in any December back to 1829, when it was 0·1 inch; this is the only instance back to 1815 of a smaller fall than in the present December. The fall of rain over the whole country in these three months was but little more than one half of the fall in the same months in the year 1872."

Mr. Tripp has sent me the results of observations, similar to those at Altarnun, made at Trent College, Derbyshire, at 150 feet above the sea. The total rainfall in 1873 was only 20·82 inches, that in February being ·80 inch when it was 5·32 inches at Truro. Cold was a good deal more severe, of course.

I am indebted to Rev. G. L. Woollcombe for a table of the rainfall at Hemerdon, above Plympton, at 360 feet above the sea. It agrees generally with that for Bodmin. The total for 1873 was 49·90 inches.

The observations on surface temperature, partially illustrated by annexed diagrams, have been continued by Mr. R. W. Fox, Mr. Moyle, Mr. Whitley, and myself, and some light will be thrown on the effects of shelter.

C. BARHAM.

Summary of Meteorological Observations at Truro, in Lat. 50° 17′ N., Long. 5° 4′ W., for the year 1873, *from Registers kept at the Royal Institution of Cornwall.*

1873.	MONTHLY MEANS OF THE BAROMETER. Cistern 43 feet above mean sea level.																	
Month.	Mean pressure corrected to 32 deg. Fahr. at sea level.			Mean of monthly means.	Mean correction for diurnal range.	True mean of monthly means.	Mean force of vapour.	Mean pressure of dry air.	Corrected absolute maximum observed.	Day.	Corrected absolute minimum observed.	Day.	Extreme range for the month.	Mean diurnal range.	Greatest range from 9 a.m. to 9 p.m.	Day.	Greatest range in any consecutive 24 hours.	Between which days it occurred.
	9 a.m.	3 p.m.	9 p.m.															
	in.	in.	in.	in.	in.	in.	in.	in.	in.		in.		in.	in.	in.		in.	
January .	29·733	29·720	29·732	29·728	·004	29·724	·261	29·463	30·230	13 14	28·578	20	1·652	·170	·58	18	·89	23 & 24
February.	30·126	30·113	30·113	30·117	·003	30·114	·202	29·912	30·708	19	28·988	26	1·720	·113	·47	1	·69	1 & 2
March ..	29·810	29·794	29·796	29·800	·007	29·793	·253	29·540	30·090	26	29·077	1	1·013	·073	·29	6	·89	1 & 2
April	30·076	30·068	30·080	30·075	·004	30·071	·257	29·814	30·356	30	29·577	16	0·779	·077	·26	1	·38	1 & 2
May	30·034	30·026	30·040	30·033	·003	30·030	·302	29·728	30·401	29	29·394	5	1·007	·072	·20	19	·34	27 & 28
June	30·040	30·030	30·044	30·038	·001	30·037	·370	29·667	30·347	26	29·513	12	0·834	·055	·18	25	·38	9 & 10
July	30·003	30·006	30·020	30·010	·002	30·008	·410	29·598	30·261	19	29·549	13	0·712	·044	·16	15	·32	5 & 6
August ..	29·993	29·996	30·000	29·996	·004	29·992	·433	29·559	30·303	2	29·577	28	0·726	·075	·29	28	·51	17 & 18
Sept.	30·023	30·020	30·030	30·024	·004	30·020	·367	29·653	30·493	22	29·371	15	1·122	·060	·40	15	·22	27 & 28
Oct.	29·923	29·897	29·920	29·913	·006	29·907	·304	29·603	30·528	28	29·083	23	1·445	·096	·31	21	·56	21 & 22
Nov.	29·879	29·866	29·898	29·881	·004	29·877	·272	29·605	30·448	30	29·200	1	1·248	·100	·33	27	·54	25 & 26
Dec. ...	30·312	30·299	30·310	30·307	·003	30·304	·262	30·042	30·638	3	29·583	30 31	1·056	·062	·36	31	·24	29 & 30
Means ..	29·993	29·987	30·000	29·993	·004	29·990	·308	29·682	30·400		29·291							

REMARKS.—The Barometer used is a Standard, made by Barrow, and compared with the Standard Barometer at the Royal Observatory, Greenwich, by Mr. Glaisher. The corrections for Index Error (+·008), Capillarity (+013), height above sea (43 feet), and temperature, have been applied.

TABLE No. 2.

MONTHLY MEANS OF THE THERMOMETER.

1873. Month.	9 A.M. Dry Bulb.	9 A.M. Wet Bulb.	3 P.M. Dry Bulb.	3 P.M. Wet Bulb.	9 P.M. Dry Bulb.	9 P.M. Wet Bulb.	MASON'S HYGROMETER. Mean of Dry Bulb.	Mean correction for diurnal range.	True mean of Dry Bulb.	Mean of Wet Bulb.	Mean correction for diurnal range.	Mean temp. of evaporation.	Wet Therm. below dry.	Mean dew point.	Dew point below Dry Therm.	SELF REGISTERING. Mean of all the maxima.	Mean of all the minima.	Approximate mean temp.	Correction for the month.	Adopted mean temp.	Mean daily range.	ABSOLUTE. Maximum.	Day.	Minimum.	Day.	Range.
	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°		°		°
January..	44·3	42·6	48·1	45·3	45·8	44·0	46·1	0·4	45·7	44·0	0·3	43·7	2·0	41·4	4·3	49·8	41·6	45·7	0·0	45·7	8·2	55	4 10	27	25	28
February	40·0	38·0	43·5	40·0	39·7	37·6	41·4	0·7	40·7	38·5	0·4	38·1	2·6	34·8	5·9	45·5	36·3	40·9	0·1	40·8	9·2	53	25	27	13	26
March ..	45·7	43·6	49·9	45·7	44·2	42·6	46·6	0·9	45·7	43·8	0·5	43·3	2·4	40·6	5·1	51·1	40·3	45·7	0·0	45·7	10·8	59	26 27	27	13	32
April.. ..	50·0	45·8	54·5	48·0	46·7	44·3	50·4	2·1	48·3	46·0	1·2	44·8	3·5	41·0	7·3	55·9	41·0	48·4	0·0	48·4	14·9	68	19	27	26	41
May	55·3	50·4	59·0	52·0	50·8	48·4	55·0	1·8	53·2	50·3	1·1	49·2	4·0	45·2	8·0	60·0	46·0	53·0	0·1	53·1	14·0	69	29	32	20	37
June	60·8	55·8	64·4	56·8	57·1	54·8	60·8	2·0	58·8	55·8	1·3	54·5	4·3	50·7	8·1	66·0	52·9	59·4	0·3	59·1	13·1	72	6	42	16	30
July	63·5	58·7	67·2	59·5	59·2	56·7	63·3	2·0	61·3	58·3	1·2	57·1	4·2	53·5	7·8	68·6	53·0	60·8	0·2	61·0	15·6	79	22	43	29	36
August ..	62·4	58·6	66·0	60·0	59·3	57·3	62·8	1·5	61·3	58·9	1·0	57·9	3·4	55·0	6·3	67·6	55·9	61·7	0·2	61·5	11·7	81	7	45	24	36
Sept.	57·2	54·3	61·6	55·8	55·0	52·9	57·9	1·1	56·8	54·3	0·8	53·5	3·3	50·5	6·3	63·3	50·8	57·0	0·1	56·9	12·5	70	27	40	29	30
Oct.	49·4	47·5	56·8	51·9	48·7	47·0	51·9	1·0	50·9	48·8	0·8	48·0	2·9	45·4	5·5	57·7	44·5	51·1	0·1	51·0	13·2	72	1	26	28	46
Nov.	46·9	44·9	50·5	47·0	46·9	45·2	48·1	0·5	47·6	45·7	0·5	45·2	2·4	42·5	5·1	51·6	43·5	47·6	0·0	47·6	8·1	56	22 26	31	3	25
Dec.	44·7	43·1	50·1	47·0	44·4	42·8	46·4	0·2	46·2	44·3	0·3	44·0	2·2	41·5	4·7	50·9	41·0	45·9	0·1	46·0	9·9	54	oft	25	9	29
Means ..	51·7	48·6	56·0	50·7	49·8	47·8	52·6	1·2	51·4	49·1	0·8	48·3	3·1	45·2	6·2	57·3	45·6	51·5	0·1	51·4	11·7	65·7		32·7		33

The Thermometers are placed on the roof of the Royal Institution in a wooden shed, through which the air passes freely. The Standard Wet and Dry Bulbs are by Negretti and Zambra, and have been corrected by Mr. Glaisher.

1873.	WINDS.																											
Month.	E.			S.E.			S.			S.W.			W.			N.W.			N.			N.E.			AVERAGE FORCE.			
	9 a.m.	3 p.m.	9 p.m.	9 a.m.	3 p.m.	9 p.m.	9 a.m.	3 p.m.	9 p.m.	9 a.m.	3 p.m.	9 p.m.	9 a.m.	3 p.m.	9 p.m.	9 a.m.	3 p.m.	9 p.m.	9 a.m.	3 p.m.	9 p.m.	9 a.m.	3 p.m.	9 p.m.	9 a.m.	3 p.m.	9 p.m.	Mean.
January..	2	3	3	1	0	1	6	5	3	10	12	11	5	4	6	3	3	5	2	1	1	2	2	2	2·4	3·6	3·0	3·0
February.	6	5	5	1	2	3	1	1	0	2	1	2	0	0	0	4	8	8	8	7	6	6	4	4	2·2	2·8	2·5	2·5
March ..	5	8	9	3	2	2	2	0	0	2	4	3	3	3	3	6	7	8	5	4	4	5	3	2	2·6	3·0	2·2	2·6
April	4	6	4	1	3	2	0	1	0	0	0	0	5	3	1	6	9	11	7	5	10	7	3	2	2·4	3·0	1·9	2·4
May	8	7	7	0	0	0	1	0	0	2	1	1	6	7	8	5	9	10	9	7	5	0	0	0	2·6	3·1	1·9	2·5
June	1	0	0	3	2	2	0	4	4	7	2	1	5	7	5	6	8	11	6	6	6	2	1	1	2·3	2·5	1·8	2·2
July .. .	2	1	1	1	4	5	3	1	0	7	5	6	15	14	13	2	5	4	0	1	2	1	0	0	2·4	2·6	1·5	2·2
August ..	2	2	2	1	0	0	0	1	3	8	7	6	11	11	8	8	10	12	0	0	0	1	0	0	2·5	3·0	1·6	2·4
Sept.....	6	6	4	2	1	1	1	1	3	2	1	2	6	10	6	8	9	11	4	2	3	1	0	0	2·3	3·0	1·6	2·3
Oct.	1	0	0	0	1	1	6	5	3	7	6	4	4	6	8	9	7	10	4	4	4	0	2	1	1·8	2·5	1·7	2·0
Nov.....	6	8	9	3	2	1	3	3	1	1	2	3	6	7	3	8	5	10	1	0	0	2	3	2	2·6	2·8	2·0	2·5
Dec.	2	2	4	2	3	1	7	6	4	1	4	3	10	9	10	3	4	5	5	1	3	1	2	1	1·5	2·0	1·8	1·8
Total....	45	48	48	18	20	19	30	28	21	49	45	42	76	81	71	68	84	105	51	38	44	28	20	15	27·6	33·9	23·5	28·4
Means ..	47·0			19·0			26·3			45·3			76·0			52·3			44·3			21·0			2·3	2·8	2·0	2·4

The force of the Wind is estimated on a scale from 0 to 6, from *calm* to violent *storm*.

1873. Month.	WEATHER.																				
	AVERAGE CLOUDINESS.				RAINFALL.					Mean weight of vapour in a cubic foot of air.	Mean additional weight required for saturation of the air.	Mean humidity of atmosphere.	Mean elastic force of vapour.	Mean weight in grains troy of a cubic foot of air.	Amount of water in a vertical column of air.	SUN.			Dry.	Wet.	REMARKS.
					Amount in inches.			Greatest Fall in 24 hours. Truro.													
	9 a.m.	3 p.m.	9 p.m.	Mean.	Truro.	Penarth.	No. of days in which rain fell.	Depth.	Date.							Shine.	Gleam.	Cloud.			
					in.	in.				grs.	grs.		in.	grs.	in.						
January .	8·0	8·9	8·0	8·3	5·32	4·62	25	·58	23	3·1	0·5	79	·261	531·0	3·6	12	3	47	66	27	Frost, 17, 20, 21, 25, 31. Hail, 2, 20, 21, 22. Gale, 1, 3, 4, 8, 9, 10, 22, 24. Thunder Storm, 19. Snow, 19, 20, 21.
February	7·8	7·7	7·8	7·8	5·03	4·91	15	1·17	1	2·3	0·7	77	·202	537·2	2·8	17	6	33	75	9	Snow, 3. Frost, 3, 10, 11, 23. Hail, 12, 23. Gale, 12, 25. Remarkable Rain, 1, 24, 28.
March ..	7·2	7·3	6·8	7·1	4·05	4·08	18	·73	15	2·8	0·8	79	·253	531·2	3·5	31	4	27	75	18	Frost, 6, 13. Hail, 9, 10, 12, 13. Gale, 9, 15. Remarkable Rain Fog, 30.
April	6·0	6·5	5·0	5·8	0·51	0·52	13	·09	16	3·0	0·8	79	·257	530·0	3·5	43	2	15	85	5	Frost, 9, 11, 24, 25. Hail, 6, 7, 8. Fog. 4. Swallow seen, 13. Cuckoo heard, 15.
May	6·4	5·7	6·0	6·0	1·49	1·56	9	·50	20	3·4	1·1	74	·302	529·1	4·1	44	2	16	85	8	Frost, 20. Gale, 7, 8, 17. Fog, 12.
June	7·0	6·8	6·8	6·9	1·38	1·34	11	·31	11	4·0	1·6	71	·370	527·2	5·0	35	3	22	85	5	Lightning seen, Thunder not heard.
July	6·3	6·4	5·5	6·1	3·69	3·29	18	1·34	24	4·6	1·4	77	·410	515·8	5·6	46	2	14	80	13	Remarkable Rain, 3, 24. Thunder Storm, 22.
August ..	7·5	7·0	6·9	7·1	4·81	4·40	24	·57	18	4·9	1·1	82	·433	514·6	5·9	30	6	26	81	12	Lightning seen, Thunder not heard, 26. Thunder Storm, 25. Gale, 28.
Sept.	6·6	6·2	5·4	6·1	2·41	2·79	19	·78	14	3·9	1·3	75	·367	519·2	5·0	37	3	20	82	8	Remarkable Rain, 14. Lightning seen, Thunder not heard, 14. Gale, 15.
Oct. ...	7·1	6·8	6·4	6·8	3·34	3·23	23	·51	22	3·4	0·8	80	·304	525·7	4·2	29	5	28	74	19	Frost, 26, 27, 28, 29, 30. Hail, 8. 24, 25. Thunder Storm, 13. Lightning, Thunder not heard, 23.
Nov.	7·8	7·8	7·5	7·7	4·05	3·92	23	·53	4	3·0	0·8	79	·272	530·0	3·9	21	1	38	74	16	Frost, 3, 4. Gale, 22, 23. Thunder Storm, 7, 26. Lightning seen, Thunder not heard, 6.
Dec.	8·0	7·3	7·0	7·4	1·23	1·21	18	·39	30	3·1	0·5	86	·262	531·0	3·5	16	3	43	81	12	Frost, 9, 10, 11, 12, 13, 29. Fog, 6, 7. Gale, 29, 30.
Means ..	7·1	7·0	6·6	6·9	37·31	35·87	216			3·4	1·0	78	·308	526·8	4·2	30·0	3·4	27·0	78·6	12·7	

Cloudiness is estimated by dividing the sky into ten parts, and noting how many of these are obscured. The rain gauge at Truro is placed on the roof of the Royal Institution at about 40 feet from the ground. Gleam is recorded when the sun's disk is visible through a film of cloud. The rain gauge at Penarth, near Truro, is 100 feet above the mean level of the sea.

Rain-fall in Cornwall in 1873, *with the yearly and monthly averages for some Stations.*

STATIONS FROM WEST TO EAST.	Jan. in.	Feb. in.	March in.	April in.	May in.	June in.	July in.	August in.	Sept. in.	Oct. in.	Nov. in.	Dec. in.	Total 1873. in.	Average yearly total.
(*a*) Land's End, Mr. J. Symons, Junr., 1873	4·24	4·48	3·51	·66	1·81	2·04	3·28	5·41	2·41	3·80	4·74	1·56	37·94	
Days with rain.....1873	19	10	14	4	5	5	8	13	9	15	14	6	122	
(*b*) Penzance, Mr. W. H. Richards..1873	5·77	6·62	4·28	·58	2·12	2·02	4·23	5·12	2·73	4·25	3·99	1·36	43·07	
Average of last fifteen years.....	5·47	3·75	3·34	2·16	2·09	1·95	2·60	2·92	3·79	4·75	4·42	5·00		42·05
(*c*) Poltair, Penzance, Col. Trelawny, 1873	7·09	7·68	4·59	·96	2·30	2·67	4·54	5·98	2·86	5·02	4·41	1·58	49·68	
(*d*) Helston, Mr. M. P. Moyle.....1873	4·88	3·89	5·59	·73	2·01	1·83	3·98	4·05	3·13	3·61	4·31	1·14	39·15	
Average of last twenty-four years	4·29	2·71	3·12	2·45	2·32	2·09	2·60	2·67	3·09	4·47	3·70	3·68		37·25
Days with rain.....1873	23	15	21	12	10	12	15	21	14	23	21	11	198	
Average of last twenty-four years	20·5	15·8	16·0	11·9	11·8	12·1	13·0	12·9	13·9	18·4	17·5	18·9		183·7
(*e*) Truro, Royal Institution of Corn. 1873	5·32	5·03	4·05	·51	1·49	1·38	3·69	4·81	2·41	3·34	4·05	1·23	37·31	
Average of last twenty-four years	5·26	3·06	3·11	2·70	2·58	2·22	2·48	2·60	3·34	4·81	4·21	4·52		40·93
Days with rain.....1873	25	15	18	13	9	11	18	24	19	23	23	18	216	
Average of last twenty-four years	21·2	16·2	16·9	13·1	13·5	12·5	12·9	13·7	16·1	20·1	18·8	19·9		194·0
(*f*) St. Agnes, Mr. J. Opie 1873	5·08	4·29	3·76	·53	1·66	1·39	3·81	5·06	2·52	3·34	4·02	1·60	37·06	
Days with rain.....1873	20	11	18	6	9	8	18	18	15	18	20	13	174	
(*g*) Newquay, Mr. Tregidgo 1873	4·07	4·80	3·49	·54	1·74	1·12	3·11	5·47	2·26	3·21	3·58	·93	34·32	
Days with rain.....1873	19	14	18	9	10	7	15	17	12	21	21	12	175	
(*h*) S. Mewan, Rev. G. L. Woollcombe, 1873	6·12	5·88	5·95	·64	2·60	2·39	4·00	5·63	3·26	3·70	4·35	1·16	45·68	
Days with rain.....1873	20	14	16	10	11	16	18	18	15	16	18	12	184	
(*i*) Bodmin, Com. J. Liddell, R.N. 1873	8·52	4·95	4·47	·66	2·10	2·34	4·23	6·54	4·14	4·51	6·06	1·32	49·84	
Average of last twenty-four years	6·03	3·34	3·57	28·1	2·85	2·95	3·08	3·41	3·88	5·49	4·62	4·98		47·01
Days with rain.....1873	24	14	18	12	13	14	19	27	22	24	23	17	227	
Average of last twenty-four years	22·0	18·4	17·5	14·0	13·9	14·7	15·2	16·2	17·5	20·6	21·1	22·7		213·8
(*k*) Altarnun Vicarage, Mr. C. U. Tripp, 1873	10·72	4·74	5·68	·55	2·83	2·24	5·19	9·12	4·61	6·53	5·89	1·92	60·02	
Average of last ten years	8·78	5·83	4·58	2·94	3·26	2·19	3·61	4·45	5·66	7·59	5·72	6·81		61·42
Days with rain.....1873	27	12	18	10	10	14	22	28	21	22	22	19	223	
Average of last ten years	22·2	20·8	18·5	14·3	13·7	12·8	15·7	16·6	19·5	22·1	19·3	20·8		216·3

(*a*) Diameter of Gauge 5 inches; height above sea 308 feet; above ground 3 feet.
(*b*) " " 12 " " " 86 " " " 3 "
(*c*) " " 5 " " " 243 " " " 6 inches.
(*d*) " " 5 " " " 115 " " " 5 feet.
(*e*) " " 5 " " " 56 " " " 40 "

(*f*) Diameter of Gauge 11 inches; height above sea 278 feet; above ground 1 foot 4 in.
(*g*) " " 6 " " 90 " " 1 " 9
(*h*) " " 5 " " 275 " " 1 " 0 "
(*i*) " " 5 " " 338 " " 1 " 0 "
(*k*) " " 5 " " 570 " " 1 " 0 "

CHRONOLOGICAL MEMORANDA.

1873.

January 1. The *Archæologia Cambrensis* contains a Paper by E. H. W. Dunkin, Blackheath, on "The Megalithic Circle at Duloe, Cornwall."

January 1. *Western Morning News* publishes an article: "Eighteen Hundred and Seventy-two in the West of England," including a Meteorological Review compiled from a Register kept at Plymouth, by Dr. Merrifield.

January 8. The *Cornish Telegraph* publishes an "Abstract of the Weather at Penzance and neighbourhood for the year 1872"; by W. Hosken Richards.

January 9. Conversazione of the Plymouth Institution, at the Plymouth Athenæum.

January 9. *West Briton* publishes articles entitled: "Cornish Mining in 1872," and "Cornwall in 1872."

January 15. Annual Meeting of the Royal Cornwall Polytechnic Society; the President, Mr. Charles Fox, presiding. Mr. Arthur Pendarves Vivian, M.P., was elected President for the ensuing year; and Colonel Tremayne, Mr. Jonathan Rashleigh, Mr. Richard Taylor, and Mr. Charles Fox, were elected Vice-Presidents.

January 17. *Western Morning News* publishes "The Life and Times of Dr. Borlase," from a Lecture delivered at the Penzance Institute by Mr. W. Copeland Borlase, B.A., F.S.A., Castle Horneck.

January 22. *Cornish Telegraph* publishes a notice of "Dr. Borlase, the Cornish Antiquarian," from a Lecture given at the Penzance Institute, by Mr. W. Copeland Borlase, of Castle Horneck.

January 23. *West Briton* publishes an article on "The Mayoralty of Truro," with a list of the gentlemen who have filled the office of chief magistrate in Truro in the present century.

January 29. *Western Morning News* publishes a note of inquiry, from "Thomas Q. Couch," on a moot point in Natural History; whether the adder, in time of alarm or danger, open her mouth and swallow her young for safety.

February 7. *Western Morning News* publishes a notice of a lecture delivered by Mr. T. R. A. Briggs, F.L.S., on "The Botany of Plymouth, in connection with its physical features and climate."

February 10. *Western Morning News* publishes an article entitled "Devonshire in 1871."

February 12. *Western Morning News* publishes "The Census of Cornwall" in 1871.

February 13. *West Briton* publishes a notice of a Lecture by Mr. T. Cornish, President of the Penzance Institute, on "Ferguson on Rude Stone Monuments, as applied to West Cornwall."

March 3. *Western Morning News* records the recent capture of an *Octopus* by Mr. Matthias Dunn, Mevagissey, and that it would be placed in the Brighton Aquarium, where a specimen previously furnished by Mr. Dunn, had been devoured by a Dog-fish.

April 1. Miners' Association of Cornwall and Devon. General Meeting at Redruth; Rev. Saltren Rogers, a V.P., in the chair, in the absence of the President, Mr. G. L. Basset. Mr. Benedict Kitto appointed Lecturer, in place of Mr. J. H. Collins, resigned, but appointed an Honorary Secretary. The Lecturer reported that in the Session which would close in May, about 30 young men had been under instruction at St. Agnes, Breage, Pool, Camborne, Redruth, Helston, St. Day, St. Just, Pendeen, Hayle, and St. Austell.

April 11. An Octopus, or Devil-fish, captured in Falmouth Harbour, by Mr. John Burton; and was next day, sent to the Crystal Palace Aquarium.

April 23. *Cornish Telegraph* publishes a brief notice of a Paper read at a recent meeting of the Philological Society, by Mr. H. Jenner, of the British Museum, "On the Ancient Cornish Language."

May 3. *Cornwall Gazette* publishes a letter, from Mr. Christopher Cooke, London, on "Tin Mines" (in ancient Cornwall); with allusions to former discoveries of gold in Cornwall, and to the supposition that, before the arrival of the Romans, the ancient Britons understood the art of coining.

June 14. *Cornwall Gazette* publishes a letter from Mr. Christopher Cooke, London, on the "Lemon Family," (and Truro).

June 19. *Western Morning News* records that during the work of restoration of Hayle Church, a remarkable staircase was found, which it is believed led to the rood-loft of a much older Church than the present. A curiously carved stone supposed to have belonged to an older building had also been discovered.

July 14. Death of Mr. John Thomas Henry Peter, of Harlyn, in St. Merryn, and Chiverton, in Perranzabuloe.

July 22. Devonshire Association for the Advancement of Science, Literature, and Art. Twelfth Annual Meeting, at Sidmouth; The Honourable Stephen Cave, M.P., President. The following Papers were read; Devonshire Cavern Literature; W. Pengelly, F.R.S., F.G.S. Sketch of B. R. Haydon; Rev. Treasurer Hawker. The Common Seals of Devon; R. N. Worth. Annelids *versus* Rain-drops, or Remarks on Mr. Hall's Papers on Fossil Rain-drops; E. Parfitt. Meteorology of Sidmouth in 1872; J. Ingleby Mackenzie, M.B., F.M.S. The Rainfall on the St. Marychurch Road, Torquay, during the nine years ending December 1872; W. Pengelly, F.R.S., F.G.S. Rainfall in Devonshire in 1872 and in the seven years ending December 1872; W. Pengelly, F.R.S., F.G.S. On Devonshire Tokens, Part II; H. S. Gill. On Devonshire Lanes; J. R. Chanter. Notice of Gold Coins found at Blackpool, Dartmouth, in 1869; A. R. Hunt. The Toad-Stone; W. H. Gamlen. Notice of supposed Acoustic Jars found in the parish church of St. Andrew, Ashburton; J. D. Amery. On Domestic Servitude in Devon 100 years ago; Rev. Treasurer Hawker. The Granite Boulder on the shore of Barnstaple Bay; W. Pengelly, F.R.S., F.G.S. Local Vestiges of Sir

Walter Raleigh; Rev. H. G. J. Clements, F.R.G.S. Submerged Forest and Mammoth Teeth at Sidmouth; P. O. Hutchinson. Fauna of Devon, Part IX; E. Parfitt. On some unrecorded Hill Fortresses near Ashburton; P. F. S Amery. Relics of the Past observed at Torquay; W. Pengelly, F.R.S., F.G.S. On the occurrence of "Calosama Sycophanta"; J. B. Rowe, F.L.S. Researches into some Ancient Tumuli on Dartmoor; C. Spence Bate, F.R.S. Memoir of Sir George Cary, of Cockington; R. Dymond, F.S.A. The Cave Man of Mentone; W. Pengelly, F.R.S., F.G.S.

July 23. *Cornish Telegraph* publishes a letter from Mr. W. C. Borlase, Castle Horneck, descriptive of "The ancient settlement at Chysoister, in Gulval."

July 29 *to August* 5. Royal Archæological Institute of Great Britain and Ireland. Meeting at Exeter. The Earl of Devon, President. Honorary Secretaries, Sir John Maclean, and Mr. Joseph Burtt. The following were the sectional presidents and officers:—Antiquities—Mr. O. Morgan, M.P., F.S.A., president; Mr. G. T. Clark, F.S.A., vice-president; Mr. W. H. Tregellas, secretary. Architecture—Ven. Archdeacon Freeman, president; Mr. Beresford Hope, M.P., F.S.A., vice-president; Mr. Talbot Bury, F.S.A., secretary. History—Sir John St. Aubyn, M.P., president; Sir John Maclean, F.S.A., vice-president; Rev. C. W. Bingham, secretary. The following Papers were read. The Worthies of Devon; Mr. G. Clarke, F.S.A. On a Mediæval Ring, found near the site of the Priory of St. Mary, Pilton; J. R. Chanter. Stone Remains on the eastern side of Dartmoor; G. Wareing Ormerod, M.A., F.G.S. The place of Exeter in the History of England; Mr. Freeman. Royal Letters and other documents, amongst the municipal records of Exeter; Mr. W. Cotton. The Birthplace, Origin, and Character of Sir Francis Drake; Dr. Drake. The Stained Glass in the Cathedral; Mr. Stuart Moor. The Abodes of the Cornu-Britons; Mr. W. C. Borlase, M.A., F.S.A. Grimspound, and its associated relics; Mr. C. Spence Bate, F.R.S., &c. Ancient Mining Implements; Mr. R. N. Worth. The Heraldry of Exeter; Rev. F. T. Colby, B.D., F.S.A. The Celt and the Teuton in Exeter; Mr. T. Kerslake. Dowrish, an ancient seat of the family of that name; Dr. Drake. A few facts about Newcomen; Mr. T. Lidstone. A Paper on a Cornish Miracle Play, by Rev. Dr. Bannister was not read, owing to its author's illness.

July 29—31. Institution of Mechanical Engineers. Meeting at St. John's Hall, Penzance; Mr. Branwell, vice-president, in the chair. The following Papers were read:—On the Mining district of Cornwall and West Devon; J. H. Collins, F.G.S., St. Austell. On Machinery for dressing Tin and Copper Ores; Henry T. Ferguson, Truro. Description of the Tin Stream-Works in the Restronguet Creek, near Truro; Charles D. Taylor, Devoran. On the application of Portable Engines for Mining Purposes; John Richardson, Lincoln. Description of a Machine for shaping the models used in experiments on the forms of ships; W. Froude, F.R.S., Torquay. Description of the Mechanical Scraper for removing incrustations in the mains of the Torquay Water-Works; Mr. Little, Torquay. Description of the Brecket Chains for suspending double-headed rails on the West Cornwall Railway; J. D. Sheriff, Truro. On Hydraulic Machinery for steering, reversing, and discharging cargo, &c., in Steam-ships; Andrew Betts Brown, Edinburgh. Excursions to Messrs. Freeman's Granite Works at Penryn, and the Restronguet Stream-works. Visit to Messrs. Bolitho's Smelting-works at Chyandour. Excursions to Botallack and Land's End; Messrs. Harvey's Foundry at Hayle, Dolcoath, and Carn Brea.

July (and October). The *Reliquary, Quarterly Archæological Journal,* contains the commencement of a series of papers on the "Church Bells of Cornwall, their Archæology and present condition"; by E. H. W. Dunkin, Blackheath. When completed, these papers will give full information as to the inscriptions and size of all the bells in the mother church of every parish in the county; chiefly from personal visitation.

August 5. Miners' Association of Cornwall and Devon. Annual Excursion. From Redruth to the Perran Iron Mines, on invitation from Mr. W. R. Roebuck.

August 6.—*Western Morning News* records the capture, off Mevagissey, of a Thrasher, or Fox Shark, *Carcharias Vulpes*, Cuv. It was six feet in length, and was caught on a hand line.

August 26.—Royal Cornwall Polytechnic Society. 41st Annual Meeting; Mr. Arthur Pendarves Vivian, M.P., President.

August 27.—*Cornish Telegraph* records the blooming of an American Aloe *(Agave Amaryllidaceæ)*, in the garden of Mrs. Pidwell, at Treveor Cottage, Alverton, Penzance. The plant, probably about 25 years old, in very healthy condition, and displaying a candelabra-like column nearly 25 feet high, with 35 floral blossoms.

August 28. Miners' Association of Cornwall and Devonshire. Annual Meeting at Falmouth; Mr. Basset, of Tehidy, presiding. The following Papers were read:—On recent improvements in the construction and setting of Jordan's Patent Combination Boiler; T. B. Jordan. Note on the Great Perran Iron Lode; J. H. Collins, F.G.S. On the Duty of Cornish Engines; J. Hocking, C.E. On the use of Concrete for making Leats or Watercourses; Dr. Le Neve Foster. Further Notices of Rock-drilling Machinery; T. B. Jordan. Description of a Condensing Apparatus for condensing poisonous gases and the fumes of sulphur and arsenic; S. T. Rowe, Redruth.

September 7. Death, at Penzance, of Miss Elizabeth Catherine Thomas Carne, youngest daughter of the late Mr. Joseph Carne, and herself possessed of very considerable literary and scientific attainments. A memoir of the deceased lady was published in the *Cornish Telegraph* of September 10.

September 17, *and following days.* 43rd *Annual Meeting of the British Association, at Bradford;* President, Professor Williamson. Among the Papers read were the following: Ninth Report of the Committee for the Exploration of Kent's Cavern; Mr. W. Pengelly, F.R.S., F.G.S. On the Flint and Chert Implements found in Kent's Cavern, Torquay; by Mr. W. Pengelly, F.R.S., F.G.S. On the Discovery of a Species of Starfish in the Devonian Rocks of South Devon; by Mr. A. Champernowne.

September 27. *Cornwall Gazette* publishes a letter from Mr. Christopher Cooke, London, on "The Cornish Language and its relation to Latin."

October 1, 15, 22, 29. *Cornish Telegraph* publishes communications from "W. B.", "W. N.", "C.", and "R. Pentreath", concerning the derivation of the word "kiggal," as equivalent, in West Cornwall, to *spindle.*

October 4. *Cornwall Gazette* publishes a letter from Mr. Christopher Cooke, London, on "The Cornish Language and its relation to Greek."

October 9. *West Briton* publishes, from the *Freemason*, a Memoir of the masonic career of the late Rev. Dr. Bannister, of St. Day.

October 15. *Cornish Telegraph* contains the following: ANCIENT STONE. —Considerable attention is being drawn to an ancient stone in the plantation near Carnsew, Hayle. A gentleman of high standing as an antiquary has lately examined, and taken a photograph of it, and hopes, by careful research, to be able to give a reliable opinion as to its date and original purpose. The opinion has been expressed that it marked the grave of one of the earliest Christians.

October 17. Royal Geological Society of Cornwall. 60th Annual Meeting, at Penzance; Mr. Warington Smyth, F.R.S., F.G.S., President, in the chair. Among Papers read were the following: Describing Sections of Pits sunk in the Western Green, near Newlyn; Mr. T. Cornish. Glacial Action in North Devon; Mr. Whitley. Notes on some Specimens of Minerals; Dr. Le Neve Foster.

November 1. *Cornwall Gazette* records a recent commemoration, at Mylor Church, of "the 1462nd Anniversary of the origin and dedication of Mylor Church and parish, in the martyrdom of the British saint, Meilyr (or Melorus), son of Melianus, Duke of Cornwall, by his Pagan brother-in-law, Rinaldus, A.D. 411.

November 7. *Western Morning News* contains a report of a Paper read the previous evening at the Plymouth Institution, by Mr. C. Spence Bate, F.R.S., on "Grimspound and its associated relics."

November 13. Oxford Local Examinations. Presentation of Prizes and Certificates at Truro, by the High Sheriff of Cornwall, Colonel Grylls.

November 18. Royal Institution of Cornwall, 55th Annual General Meeting; Sir John St. Aubyn, Bart., M.P., President, in the Chair. Dr. Jago, F.R.S., elected President for the ensuing year. In the evening, a Conversazione, in the Institution Lecture Room. (See *Journal of the Royal Institution of Cornwall*, No. XV., *and 56th Annual Report*).

November 22. *Cornwall Gazette* publishes, from *Notes and Queries*, a communication by Mr. Thomas Kerslake of Bristol, concerning "The Treffry Family," and "Treveris"—the printer of the *Grete Herboll*, 1516."

December 1. At a meeting of the Royal Irish Academy, a Paper was read by Samuel Ferguson, Esq., LL.D., "On the Completion of the Biliteral Key to the Values of the Letters in the South British Ogham Alphabet."* Mr. Ferguson, premising that the Ogham Inscriptions of South Britain are distinguished from those of Scotland and Ireland by being almost always accompanied by corresponding legends in the Roman character, stated that prior to 1870 the values of almost all the letters of the South British Ogham alphabet had by this means been ascertained; there remaining to be identified, only P F L D, which were problematical, and B, which had not been found at all. In December 1870, it was pointed out to the Academy that the equivalent of P was found in a combination of Ogham digits on the monument to *Turpill* at Crickhowel. F and L might be inferred from *fiil*; and F and D from their use in the name *Doft(a)ceos* on the Tycoed monument. And in August 1873, the identification of the Ogham equivalent of B was

* An illustrated Paper concerning an Ogham Stone (now in the British Museum) found at Fardel, near Ivy Bridge, Devon, was read at a Meeting of this Institution, by Sir Edward Smirke, in 1861. See *43rd Annual Report of the Royal Institution of Cornwall*, 1861.

effected by the discovery of an Ogham inscription on the angle of the *Dobunni* monument from Buckland Monachorum, now preserved at Tavistock. The leading characters of the name *Enabarri* of the Latin text *(Dobunni fabri fili Enabarri)* are still legible in the Ogham *nabarr;* and the Oghamic representative of B is thus ascertained without resorting to external proof. External corroboration, however, is found abundantly in the substantial agreement of the results with those derived from the Irish Ogham, many of which "echo" formulas found in Latin incriptions, and in one Ogham legend in South Britain.

December 17. *Cornish Telegraph* records that, during a few previous days, a large shoal of strange fish had been driven ashore at St. Martin's, Scilly. They were supposed to be the *Wandering Chœtodon*, a Ceylon fish; but Mr. T. Cornish, of Penzance, in a letter to the C. T., says:

> "I have had an opportunity of examining three specimens of the fish which were thrown on shore, and find that they are beyond all doubt the Boar Fish *(Zeus aper)*—a rare but by no means an unknown fish to our coasts, or even at Scilly, where one at least has been already taken. In shape the Boar Fish is not unlike the *Wandering Chœtodon*; but the two fish belong to totally distinct families; and your correct statement that the *Wandering Chœtodon* is an inhabitant of the Ceylon seas pretty well disposes of the possibility of its appearance in shoals at Scilly. No doubt West Indian shells are, and possibly West Indian fish might be, found in our seas; but the case is very different when East Indian fish are talked of."

December 20. *Cornwall Gazette* publishes a letter from Mr. Christopher Cooke, London, on "Cornish Minerals."

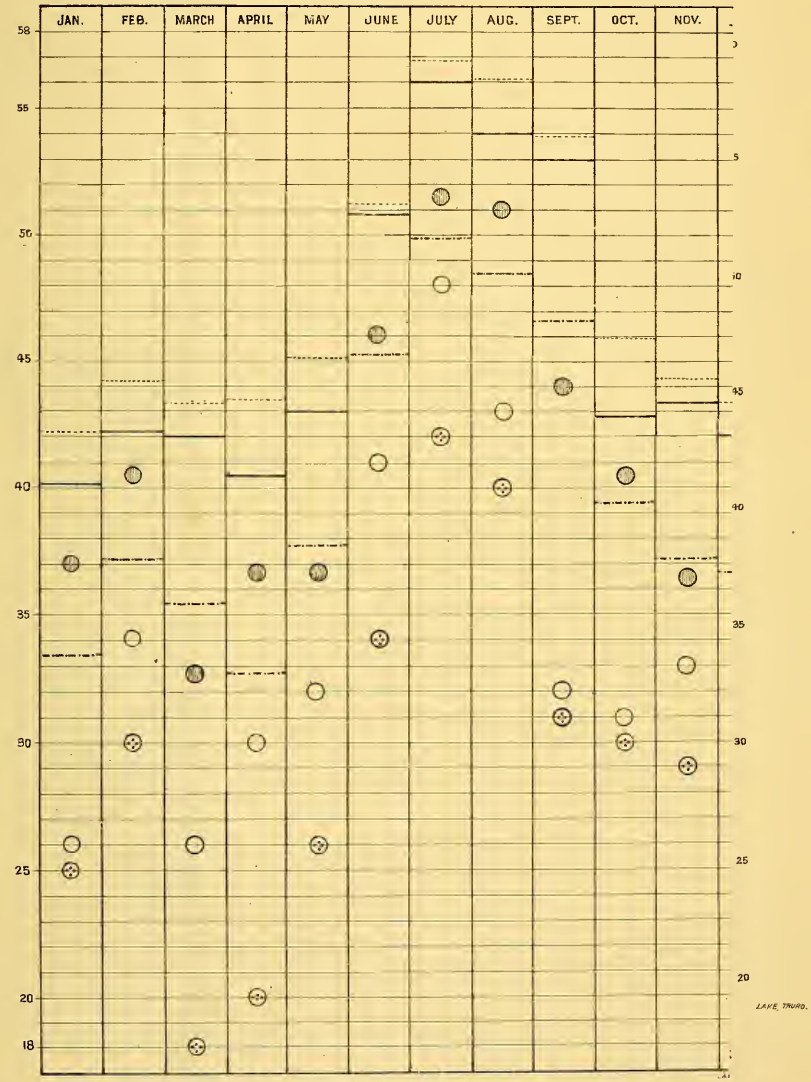
NETHERTON, PRINTER, TRURO.

1872.

Showing the MEANS of MINIMA for each Month of the Year 1872,

together with the ABSOLUTE MINIMUM for each Month at Truro and Falmouth;

and also the like Particulars as Measured by Thermometer 6 inches above the Grass, at Penjerrick, near Falmouth.



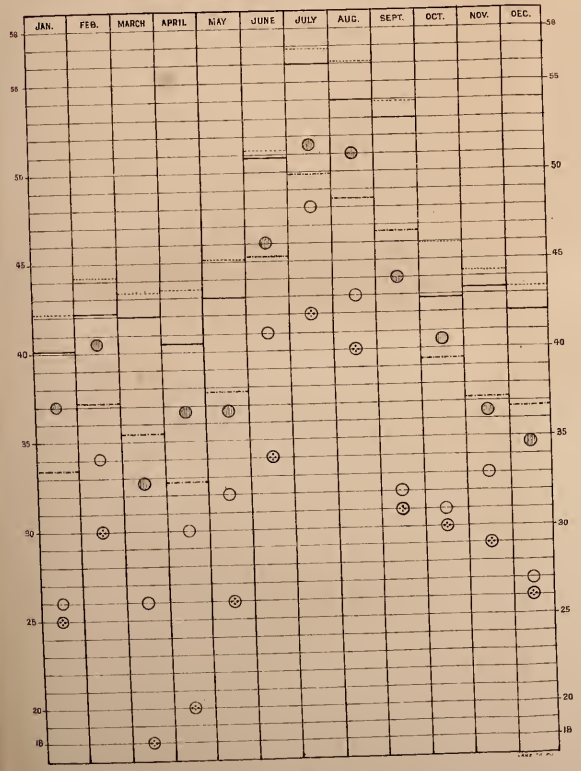
Royal Institution of Cornwall, Truro.
Mean of Minima.
Absolute Minimum.

Falmouth Observatory.
Mean of Minima.
Absolute Minimum.

Penjerrick.
Mean of Minima on Gr.
Absolute Minimum on Gr.

1872.

Showing the MEANS of MINIMA for each Month of the Year 1872, Together with the ABSOLUTE MINIMUM for each Month at Truro and Falmouth; and also the like Particulars as Measured by Thermometer 6 inches above the Grass, at Penjerrick, near Falmouth.



Royal Institution of Cornwall — Truro. Mean of Minima

Absolute Minimum

Falmouth Observatory. Mean of Minima

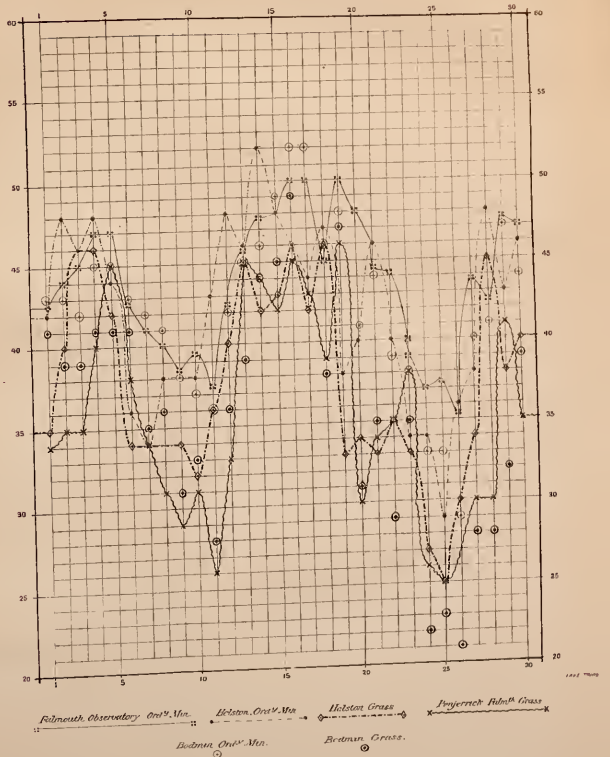
Absolute Minimum

Penjerrick &c. Mean of Minima on Grass.

Absolute Minimum on Grass.

April, 1873.

Showing LOWEST TEMPERATURE of Nights, as read from Self-Registering Thermometers on the GRASS, and some feet above the Surface.



Falmouth Observatory Grass Min.

Helston, Grass Min.

Helston Grass

Penjerrick Falmouth Grass

Bodmin Grass Min.

Bodmin Grass.

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