

APPENDIX.

[NOTE.—The following pages on the Cochineal insect and the varieties of *Opuntia* best adapted for its propagation, formed the substance of three pamphlets which were published by the late Secretary of the Society, under the sanction of their Cochineal Committee.

The subject of the inquiry, in a commercial point of view, is one of the greatest importance to the growing interests of British Asia, while the many interesting facts which the following pages convey regarding the habits and peculiarities of the wild and domesticated insect cannot but be read with pleasure by every tropical agriculturist engaged in the development of the resources of the country.]

HENRY H. SPRY, M. D.

January 23rd, 1839.

Secretary.

CULTURE OF THE "COCHINEAL."

The *Coccus Cacti*, in zoology, is partial to the unparalleled even temperature of Central America, and its vicinity. It is the famous Cochineal animal held in such high estimation in the commercial world. This insect is of both sexes, but not very similar in appearance: the female is ill-shaped and slow-motined. The male is very scarce, and one is sufficient for four hundred females.

The Nopal, or Cochineal plant, is of that species known in the West Indies as the prickly pear: it is oval, and varies in size according to growth from 6 to 12 inches across; this is found in the wild state in many parts, but that kind particularly abounds in the vicinity of Zacapa, and on the plains so called; you see it 30 or 40 feet high, and what is most singular, the trunk in process of time becomes a hard wood, from whence, following the branches out, the woody or hard quality gradually lessens, and, within 4 or 5 feet of the extremity the plant again assumes its natural appearance, and attributes, of the consistence of a cabbage stock, producing at certain seasons a well-flavoured red fruit, much sought after by the natives, as also by the parrot species of birds. The prickles on this tree are very long,

tough, and sharp; the absence of the prickle from that species which produces the Cochineal, is the great distinction.

In Central America, the cultivation of the plant for producing the Cochineal is almost confined to New and Old Guatemala and that charming valley comprised between these earthly paradises. The range of the thermometer, during ten months of the year, scarcely varies from 68 to 74 of Fahrenheit—in November and December, it sometimes falls to 50, and that seldom. The government, aware of the importance of this new and important branch of their commerce, allows its importation free of duty, in order to compete with Oaxaca, in Mexico, which, for some time back, has supplied Europe with immense quantities. I am informed by good authority that the plant was first introduced into Guatemala, afterwards cultivated in Mexico, and owing to some regulations under the old Government, discontinued in the former, until within the last four or five years, when general attention has been turned to that ready money article.

The following data are given, in order to form an idea of the funds necessary to commence a plantation—one of about 10,000 is considered a snug manageable concern; however, the extent must be, of course dependent on the will and ability of the undertaker, and the time he may be willing to dedicate.

“ESTIMATE FIRST YEAR.”—One thousand plants will cost from 30 to 50 dollars, and will require, when ready to inoculate, say at the expiration of 18 or 20 months, 25lbs. of seed, or the living animal, averaging from one dollar 50 cents to 3 dollars per lb.;—10,000 cartouches will cost 37½ cents per thousand; one mercate, or twenty fathoms, say 120 feet superficial or land measure of ground will be required for the above number of plants, which can be had in that proportion at one-dollar per year, (indeed the richest land as it respects value, is merely nominal,) to fence this in, which is indispensably necessary, as cattle of every description are excessively fond of the plant, and ever prone to trespass; the mud fence will cost 25 cents, the square, or five feet long, two feet broad, and one and a half feet thick, which is tiled on the top to guard against the rain. The other mode of fencing is by planting suckers of a tree something like our ash, which in time has a beautiful appearance, but at first presents a feeble resistance to the hungry marauder.

The ground is turned over with a hoe. The common wages is 25 cents per day for labourers; six men can weed and clean 1,000 feet in two days, which will be necessary four times a year; six women

are required two days to apply the cartouches (or inoculate 1,000 plants). Twenty-five pounds of seed is expected to produce 250 pounds of Cochineal or give 10lb. for one.

“PLANTING.”—The ground being prepared with a hoe, as before stated, about from March to May, the Nopal is planted, and they are very particular in the regularity and straightness of their lines, which has a beautiful effect.

The rainy season commences about the 20th May, and ceases generally the 15th October.

In November, the animal is applied to the plant in the following manner:—A bamboo, about the thickness of a common flute, is cut off at the joints, it is then cut in two, leaving a bottom to each section.

About a large tea-spoonful of the animal is put into the cartouch, and, by means of a hard black thorn, something like that used by tobaccoists, is struck on to the plant; in a short time, the seed is dispersed all over the plant, similar to specks of flour shaken sparingly out of a dredging box; it sheds its coat three times before coming to maturity, assuming then a black appearance—that is, the appearance is black when the coat is shed, but grey, when at maturity. This plan is generally adopted, however some apply the seed in small fragments of gauze, cloth, linen, &c., but the first is found the best.

That applied in November, requires $8\frac{1}{2}$ months to come to maturity, it being the coldest time of the year, the thermometer being the lowest, as above stated; that sown in February, requires about two months. The animal, when full grown, is scraped off with a chip or feather. Two crops are generally attempted; the latter, however, has been found very precarious, as an early rain in May, will blast the hopes of the cultivator.

It cannot be supposed that each plant gives the animal full growth; hence arises the following distinction:—

- 1st. ‘*Grana*,’ the full grown and first quality Cochineal.
- 2nd. ‘*Granilla*,’ the Cochineal not full grown when collected, or second quality.
- 3rd. ‘*Cascarilla*,’ the Cochineal that is self-dried, and that dies in the cartouch from injury in handling; this the natives call the ‘*Madre*,’ or mother of the Cochineal.

When the animal is separated from the plant, there are three modes adopted to prepare it for market; the manner depends much

upon the pressing exigency of the owner—in that case, the first method is adopted:—

1st. By killing and drying it in an oven: this gives it the black appearance.

2nd. By immersion in boiling water, and afterwards drying it in the sun.

3rd. By exposing the animal upon plates of tin to the sun. This process requires from fifteen to twenty days, and gives that beautiful silver grey. The Cascarilla is generally very black and uneven; the Granilla less black, smaller, and more even.

'*Preparation for Exportation.*'—The Cochineal is, or ought to be, sifted and cleansed of all its impurities. One hundred and fifty pounds are usually put into a cotton sack, then enveloped in a mat, and covered with a hide. The land carriage, with a drove of mules, is 2 dollars 50 cents per ceroon to Gualan, 50 leagues from Guatemala, and from thence to Omoa 4 dollars, by the river Montagna, a distance of 160 miles, to its mouth, and from the bar to Omoa 9 leagues. One thousand bales was the quantity exported last year, the greater part of which found its way to Cadiz via Havannah, in neutral bottoms. The expense of embalging 2 dolls. and 75 cents per bale.

The foregoing estimate of productiveness is not often realized and is subject to many casualties. For instance, a heavy rain, which sometimes happens in the dry season, and generally accompanied with large hail, leaves the plant clean, not a solitary inhabitant escapes, as they wash off easily, being exposed, not under cover—but the most insidious and active enemy is the worm; that fell destroying animal is known to have cleared a whole plant in twenty-four hours.

The distinguishing this marauder requires a practical, acute eye. The cobweb is also injurious;—but what contributes to lessen the profits essentially, is the thievish propensity of the Indians, who do all the labour in that quarter of the continent; however, strict attention will ensure a proprietor a lucrative return.

The seed is prepared during the wet season, the single Nopal is cut off close to the stem—and is about the size of a man's wrist—a hole is cut in it, and suspended inoculated, and the animal is in a productive state, all the time the temperature being the same. Another plan is adopted; a crib is made of bamboo, and apartments made on the shelves large enough to admit the plant separate; being under cover of the corridor, the animal keeps breeding, and is protected from the rain.

It will appear to people of limited capital that they cannot employ their funds better ; and to men of capital, where can a better return be realized ? The great advantage is, a mechanic can follow his avocations, the merchant can attend to his speculation, and have this animal working for him, the year round. The great source of riches, is open to our own citizens, who rank the first in the estimation of the central republicans, and who invite us with open arms to assist in developing the resources of that charming country.

Amer. Paper, September 26, 1827.

Calcutta Government Gazette, 17th April, 1828.

(*Extract from Curtis's Botanical Magazine, Volume 54, of the whole Work, or Volume 1, of the New Series.*)

There are few tribes of plants that require illustration, by the aid of the pencil, more than the Cactuses ; they cannot be preserved in the Herbarium, nor so easily described in words, as many other plants. An idea, too, has been very generally current, that they are liable to much variation ; but, from what we have ourselves seen of them, in a state of cultivation, we think ourselves warranted in considering them to be tolerably constant to their character.

With regard, too, to that particular species of Cactus, which nourishes the Cochineal insect, much doubt has existed ; and we believe it must be allowed, that our plant, which was named by Linnæus, and has been almost universally called the *C. cochinellifer*, is not that which produces the Mexican Cochineal ; nor are we prepared to say, of what part of South America it is a native. Linnæus speaks of it as indigenous to Jamaica and the warmer parts of the new world ; but Sloane, who gives a tolerable figure of it, says, that the plants we saw, in Mr. Worley's plantation, were brought from the main continent of America, by a Spanish priest, and affirmed to be the species on which grew Cochineal.

We know our present subject to be the true *C. cochinellifer* of Linnæus, by his references to various figures, especially to that of Dilennius in the Hortus Elthamensis above quoted ; and that author considers it may be the same as the *Nocheznopalli* or *Nopelnochetzli* figured in Hernandez ; except that, in the latter plant, the flowers are spreading, whilst in ours, the petals are connivent. He does not say where it is indigenous. In the Chelsea garden, according to Ray, it was cultivated prior to 1688, and was received from Barbadoes.

Ulloa, not upon his own authority, as it appears, but on that of well informed travellers, states, that the *Cochineal Cactus* has no spines, and a fruit imbued with a deep red pulp. This is partly contradicted by Clavigero, who says, "in Misteca, where I was for five years, I always saw the insect upon prickly Nopals. M. de Raynal imagines, that the colour of the Cochineal is to be ascribed to the red fig on which it lives; but that author has been misinformed; for neither does that Cochineal feed upon the fruit, but only upon the leaf, which is perfectly green; nor does that species of Nopal bear red but white figs." It is true Clavigero adds, "it may be reared upon the species with a red fig; but that is not the proper plant of the Cochineal."

De Candolle, in his beautiful work entitled "plantes Grasses," has given, as the Cactus *Cochinellifer*, the *C. Tuna* of Linnæus, a plant totally distinct from the Linnæan *Cochinellifer*, and whose flower is of a different structure.

Thierry de Menonville, who so courageously procured the Cochineal insect and the Cactus from Guaxaca, and transported them to St. Domingo, and who unquestionably had the best means of determining the kinds of Cacti, cultivated for the insect describes particularly three sorts, on which it may be reared and cultivated to advantage.

1. The Cactier *Nopal* upon which *alone* the Cochineal is reared in Mexico, both the fine and common Cochineal (la Cochenille *fine et sylvestre*) although there are throughout the country, many other kinds of Cactus. The two following therefore, it is presumed, are employed in St. Domingo.

2. The Cactier *Splendide*; which may be used to equal advantage with the former; and

3. The Cactier de *Campêche*.

Of these, the first, as far as can be determined by description, for the writer had never seen the flower or fruit, is the Cactus *Tuna* of Linnæus; *C. cochinillifer* of De Candolle.

The second appears from the account to be very similar to the former, but larger in its joints (some of them thirty inches long), and very glaucous.

The third, the *C. de Campêche* is, I think, without a doubt, our *C. cochinillifer*, for his whole description, and especially the flowers and fruit, entirely correspond; and he says of it, from his own experience, that it may be usefully employed for rearing the Coche-

nille *sylvestre*, and may even support a small quantity of the fine kind.

The celebrated Humboldt also, though he allows that it is the plant upon which the Cochineal has often been sent to Europe, asserts, that our Cactus *cochinillifer* is not the individual of the Mexican Nopaleries, which he makes a new species, under the name of *C. Bonplandii*; and he quotes under it, with a mark of doubt, the Cactus *Tuna* of Linnæus.

At Rio de Janeiro, when that place was visited by the Chinese embassy, under Lord Macartney, there were considerable plantations of Cactus, for rearing the Cochineal, which had some time previously been introduced into Brazil; and the plant, which is the Cactus *Tunas* is represented on the twelfth plate of the Atlas of that work.

I shall further, upon the subject of the kinds of Cactus employed in rearing the Cochineal, only add, that my excellent friend the Reverend L. Guilding, who sent me most splendid drawings of this particular Cactus, and from which most of the accompanying figures were executed, wrote me two years ago from St. Vincent: "I possess a considerable nursery of this Cactus, inhabited by thousands of the true *Coccus Cacti*; and I do not despair of being able to send to the Society of Arts, a large quantity of dried insects, before the termination of the present year." In the East Indies also, the insect has been extensively propagated; but we have not had the means of knowing whether successfully or otherwise.

From all this, we think it may be inferred, that, in Mexico and Brazil, the Cactus *Tuna* is the favorite food of the Cochineal; and that in the West Indian Islands, where the *C. Tuna* is, perhaps, less frequent, the *C. cochinillifer* is employed by the natives, and answers the purpose sufficiently well.

MEMORANDUM ON THE CULTIVATION OF COCHINEAL.

(Received in a communication from John Vaupell, Esq. Secretary to the Agricultural Society of Bombay, under date the 5th December, 1836, and read at a General Meeting of the Agricultural Society of Calcutta, on the 8th February, 1837.)

The most extensive cultivation of Cochineal is in the district of Misteca in the state of Oaxaca Mexico; and the finest sort is found at Guaxaca distant from Vera Cruz about 70 leagues.

2nd. Travellers differ concerning the species of plant cultivated, some asserting it to be a Cactus with thorns, and others maintaining it to be one without, assigning reasons for each, the one, as being a protection to the insects against birds, the other, as absolutely necessary to enable the cultivators to collect the insects.

3rd. With regard to the plant in India, experimental practice alone will teach us which plant is to be preferred. At the Cape of Good Hope, the insects left the Cactus on which they were brought and which was the Cactus Cochinelifer of Linnæus, and preferred the common Cactus of the place the Opuntia with thorns, which grows rapidly, and generally throughout the colony. The same species appears to grow most rapidly in the Deccan.

4th. Monsieur Thierry de Menonville, from his having visited Mexico in 1777 for the express purpose of inquiry into this subject, should be the best authority, he states that the insect is reared on the Cactus Nopal in Mexico, although there are several other kinds throughout the country the former is supposed by some to be the Cactus *Tuna* of Linnæus.

5th. In Oaxaca, some plantations contain 50 or 60,000 Nopals
Ward. in lines, with an interval of 3 yards between each, being kept about four feet high for greater access in collecting the insect : it is said that the flower and fruit are carefully cut off to prevent the insects depositing their eggs therein.

6th. The greatest quantity of Cochineal is produced in small detached plantations of Nopal termed Nopaleros, which occupy the
Kirby. cleared ground on the slopes of hills, ravines, or any dry barren waste, and otherwise unprofitable land, around and remote from their villages.

7th. It is necessary to keep the leaves of the Nopal perfectly clean, which is performed by the women brushing them lightly with a squirrel's or deer's tail, and sometimes with a wet cloth.

8th. There are two varieties of Cochineal, the Grana Fina or domesticated insect, and the Grana Sylvestra, or wild ; the first, has a fine downy or powdery covering, whereas the latter, has one of more substance, and cottony, which enables it to stand the inclemencies of the weather which the former are protected from by the cultivators.

9th. It is supposed that both were originally of the same stock, and that the domesticated have lost the cottony covering, and have improved in size by care, and attention, for being under cover during

the rainy seasons they have no occasion for so thick a coat: in the same manner sheep lose their wool when brought from a cold to a hot climate; what strengthens the supposition is, that none of the Grana Fina species are found in their wild state, and it is most probable that when the insect is permitted to remain exposed to the weather, it returns to its natural state, and provides the cottony covering.

10th. The young insects remain in a cluster under the mother for two or three days until disengaged from the umbilical cord, after which the females for the only time in their lives exercise their locomotive faculties by creeping to proper situations on the plant, selecting the under side of the leaves as being defended from the wind and rain, where each attaches herself by inserting her little proboscis, and thus remains fixed to the end of life, she soon becomes covered with a fine downy substance.

11th. The male acquires the same, but quits it at the end of a month, and in the shape of a little scarlet fly, jumps and flutters about for the purpose he is intended and dies immediately afterwards.

12th. But the female outlives the male another month, at the end of which she is ready to bring forth her young, and this is the precise time for gathering those which are not wanted for breeding, which is done by pressing the dull blade of a knife between the under

Kirby. surface of the leaf of Nopal and the clusters of insects attached to it, when the latter being thereby separated, fall upon cloths previously upon the ground to receive them.

13th. In some places the gathering is performed with a squirrel's or stag's tail by the Indian ryot men, who for this purpose squat down for hours together beside the plant. The female perishes when she has brought forth.

Menonville. 14th. When sufficient quantities of the insects are collected, they are dipped (enclosed in a linen cloth or bag), into boiling water and suffered to remain in it so long as is necessary to kill them but no longer, lest the water should extract some of their

Kirby. colour; they are then thoroughly dried in the sun, or they are killed by exposing them in heaps to the sun or by placing them in ovens.

Aiken. 15th. At the third gathering the branches on which the females have been left, are broken off, and kept carefully under cover during the rainy season; when this is over the stock of Cochineal

thus preserved by each cultivator is distributed over the whole plantation, where they soon multiply.

Menonville. 16th. In some places they raise frames over the Nopals on which the females are left, to protect them from the cold and rain.

17th. The Grana Sylvestris, or the wild insect, being more hardy, requires no particular care or attention, and may be gathered six times in the year; they moreover multiply themselves so rapidly as to exhaust and destroy the plants, on which account in Mexico they are almost all collected at the end of every two months, and the plants perfectly cleansed by wiping them with wetted cloths.

18th. At the Cape of Good Hope, the Baron Ludowigne, received some live Cochineal from Hamburgh (which was said to be the Grana Fina), about four years ago: about two years since Dr. Liesching seeing it still in the Green-house requested some, and advised them to distribute the insect on the wild Cactus.

19th. The Doctor cut up the leaves he had obtained, and scattered the pieces wherever he found the plant growing, and the consequence is, that the insect is found in considerable quantities about Cape Town, and appears to thrive most admirably, and is rapidly multiplying throughout the colony; at the same time it must be observed that much of the Cactus has been exhausted and destroyed for want of attention, and the probability is that as the price of labour for a considerable time to come in the Colony will be too high to allow of its being productively employed in the collection of Cochineal, the insect will destroy all the plants.

20th. But what a fine field is here opened to India; a source of revenue to Government; of wealth to the people. A system of cultivation so well adapted to the indolent Asiatic and his family, that there is little doubt of success.

21st. The species now brought from the Cape may possibly on its first transportation from Hamburgh have been the Grana Fina, or domesticated; it certainly now appears to be the Grana Sylvestris, from the descriptions of travellers, and if it has relapsed into its natural and original state, by care and protection from the rains it may be restored.

22nd. Should this not ensue we shall still have a valuable acquisition, for the wild yield double the produce of the domesticated, and the facilities, and simple nature of this cultivation are so evident, that

each Indian ryot, without capital, or even labour to himself, may rear on the hedge around his dwelling any quantity he wishes under the sole management of the females and children of his family.

23rd. The Cactus on which it thrives at the Cape, appears to be the same common *Opuntia* which grows so rapidly and universally throughout the Deccan and Candeish, a plant that was found to overrun almost every uncultivated and barren spot of ground about Poonah, where some money and much trouble were expended in vainly endeavouring to eradicate it.

24th. In conclusion, and to shew the value of the cultivation of this little insect, it is merely necessary to state that England alone is said to consume annually about 150,000 lbs. and the average value of the Cochineal exported from Vera Cruz amounts to 2,002. 387 dollars annually.

GEORGE GIBERNE.

OF THE NATURAL HISTORY OF 'COCHINEAL.'

The 'Cochineal,' or '*Coccus Cacti* of Linnæus' is arranged among the 'Insecta' of the 5th class of that great naturalist; and in the 2nd order, comprehending the 'Hemiptera' (half-winged insects, &c.)

The body of the male is slender, of a red colour, covered by two wings, spread horizontally, crossing each other a little on the back, and enabling him to fly or rather flutter. The head is distinct but small, with two diverging slender antennæ; the abdomen or tail is terminated by two small and very long diverging hairs; he has six feet, with which he sometimes jumps like the lacca insect; and hence Linnæus has applied the term '*Saltatoria*,' as one of his distinguishing characters. The male insects are but seldom found among the Cochineal sent to Europe.

The back of the female is hemispherical, and crossed by numerous wrinkles; she is of a dark, reddish, brown colour; her mouth is a small tubular projection from the throat; she is without wings, but has six legs; these however only serve her to remove during a short interval immediately succeeding her birth; after which they become useless, and, ceasing to grow from inactivity, remain so small as to be afterwards hardly perceptible, at least without a very minute inspection. This circumstance probably occasioned and certainly confirmed the belief which prevailed very generally in Europe, during

a considerable number of years, that these insects were vegetable grains or seeds.

The Cochineal is nourished, perhaps exclusively, by some of the different species of the 'Cactus,' or Indian fig, (called by some the 'prickly pear,') a genus of plants, of which Linnæus describes twenty-five several species, all originally found in America only: of very different forms and producing fruits of various colours when ripe, according to the species on which they respectively grow; as white, yellow, red, crimson, purple, violet, green, &c. Among these, the red and crimson coloured fruits more especially contain a mucilaginous juice, which communicates the colour of the fruit in a high degree to the urine of those by whom it is eaten. That species on which the Cochineal attains the greatest perfection is denominated 'Cactus Cochiniifer' by Linnæus. But the insects live naturally, in their wild state at least, on some of the other species, particularly the 'Cactus Opuntia,' and 'Cactus Pereskia,' all of which as well as the 'Cactus Cochiniifer' belong to that section of Cacti which Linnæus distinguishes as "*Opuntia compressa articulata prolifera*," *i. e.* flattened or compressed with prolific articulations. The 'Cactus Cochiniifer,' however, which the Mexican Spaniards call 'Nopal,' is alone cultivated for the purpose of feeding and breeding these insects.

The Spaniards, on their first arrival in Mexico, saw the Cochineal employed, as it appears to have been long before, by the native inhabitants of the country, in colouring some parts of their habitations, ornaments, &c. and in staining their cotton; and being struck with its beautiful colour, they gave some accounts of it to the Spanish ministry, who, in the year 1523, (as Herera informs us) ordered Cortes to take measures for multiplying this valuable commodity; but as the Spaniards then in America were careless of every thing but gold and silver, they left this object to the industry of the natives only; which however, from the large supplies soon after sent to Europe, appears to have been successfully exerted in this respect.

For a number of years the inhabitants of Europe were generally mistaken respecting the nature and origin of Cochineal, supposing it to be grain or seed, as has been already observed. The opinion to the contrary was, I believe, given by the anonymous author of a paper, in the 3rd volume of the Philosophical Transactions (printed in the year 1668), in which he supposes Cochineal to be an insect "engendered" by the fruit of the prickly pear; an being a believer of

equivocal generation, he proposes to employ fermentation as a means of engendering and multiplying these insects more copiously.

In the year 1672, a paper written by "Lister," was published in the seventh volume of the Philosophical Transactions, concerning the Kermes, in which he "conjectures Cochineal may be a sort of Kermes."

The 17th volume of the Transactions, published in 1691, contains some observations concerning the making of Cochineal, according to a relation had from an old Spaniard at Jamaica, who says,—“Cochineal is the same which we call lady-bird, alias cow-lady, which at first appears like a small blister or little knob upon the leaves of the shrub on which they breed, and which afterwards, by the heat of the sun, becomes a live insect as above, or a small grub.”

Early in 1693, Father Plumier wrote and subscribed a declaration, which he delivered to Pomet, affirming Cochineal to be an insect living on the Opuntia or Indian fig, and that he had seen it in the Island of St. Domingo; and de Laet had some little time before described it as feeding on the "tul.j." Pomet, however, misled by the prevailing opinion on this subject, as well as by several letters which about that time were sent to him from St. Domingo by F. Rousseau, adopted the fallacious accounts of this letter-writer (who promised to send over to France some of the very plants whose seeds, as he asserted, afforded the true Cochineal), and described this drug as the seed of a plant two or three feet high, bearing pods of a conical form, in which the Conchineal grew naturally. (*See Histoire Generale des Drogues, &c*)

But groundless as this account was in reality, it obtained so much credit, that no longer than four years since (the book from which these my extracts are made was written in 1794), a very eminent dyer of this metropolis seriously told me, that having bought a large parcel of Cochineal, he actually found among it one of these conical pods, containing Cochineal naturally attached to the inside like seeds.

Lewenhoek, however, by his glasses, plainly saw that the Cochineal was an insect with six legs; and in a letter, read at the Royal Society, the 21st March, 1704, and published in the XXIVth Vol. of the Transactions, he positively contradicted all those who had represented it as a vegetable grain; and declared that by dissections, he had invariably found eggs, or animalculæ, in the supposed grains, and often to the amount of 200, in each. He also represents these

insects as 'not produced from worms,' but as at once bringing forth their like.

About the year 1730, Dr. Rutley, then Secretary of the Royal Society, published a Natural History of Cochineal (in the XXXVIth Vol. of the Transactions), from a work on this subject by Melchior de la Runscher, who had procured from Antiquera in New Spain, the depositions of eight persons, who had been actually employed for many years in the breeding and management of Cochineal, and who swore that they were 'small living animals with a beak, eyes, feet,' &c. and the originals of these depositions, notarially authenticated, were deposited in the Archives of the Royal Society. Not long after this, Reaumur, in his *Histoire des Insectes*, and Dr. Brown, in his *History of Jamaica*, described the female Cochineal with sufficient accuracy; as did Linnæus some time after, from a living female sent to him by Mr. Rolander from Surinam, in the year 1756; though neither of these naturalists had ever seen the male Cochineal.

About the beginning of the year 1757, Mr. John Ellis, F. R. S. hearing that the Cochineal insect bred in great abundance on the '*Cactus Opuntia*' in South Carolina and Georgia, wrote to Dr. Alexander Garden, of Charles Town, South Carolina, for some of the joints of that plant, with the insects thereon, which were accordingly sent the latter end of that year and laid before the Royal Society. "These specimens (says Mr. Ellis) were full of the nests of this insect, in which it appeared in the various states, from the most minute, when it walks about, to the state when it becomes fixed and wrapt upon a fine web, which it spins about itself."

"In order to find out the male (continues he), I examined all the webs in these specimens, besides a large parcel which the doctor had sent me picked off from the plants in Carolina, and at last discovered three or four minute dead flies with white wings."

These I moistened in weak spirits of wine; and examining them in the microscope, I discovered their bodies to be of a bright red colour, which convinced me of their being the true male insect.

"To be confirmed in my opinion, I immediately communicated my discovery to Dr. Garden, which I accompanied with an exact microscopical drawing, and desired he would send me some account of their economy, with some male insects of his own collecting, which he did in the spring of the year 1762, accompanied with the following observations."

“In August, 1759 (says Dr. Garden), I *caught* a male Cochineal fly, and examined it in your aquatic microscope. It is seldom a male is met with. I imagine there may be 150 or 200 females for one male. The male is a very active creature and well made, but slender, in comparison of the females, who are much larger and more shapeless, and seemingly lazy, torpid, and inactive.”

“They appear generally so overgrown, that their eyes and mouth are quite sunk in their rugæ or wrinkles; nay, their antennæ and legs are almost covered by them, and are so impeded in their motions from these swellings about the insertions of their legs, that they can scarce move them much less move themselves.”

“The male’s head is very distinct from the neck; the neck is smaller than the head, and much more so than the body. The thorax is elliptical, and something larger than the head and neck together and flattish underneath: from the front there arise two antennæ, (much longer than those of the females), which the insect moves every way very briskly. These antennæ are all jointed, and from every joint there comes out four short setæ placed two on each side.”

“It has three jointed legs on each side, and moves very briskly and with great speed.”

“From the externity of the tail there arise two long setæ or hairs four or five times the length of the insect. They diverge as they lengthen, are very slender, and of a pure snow white colour.”

“It has two wings, which take their rise from the back part of the shoulders or thorax, and lie down horizontally, like the wings of the common fly, when the insect is walking. They are long, rounded at the extremity, and become suddenly small near the point of insertion. They are much longer than the body, and have two long nerves: one runs from the basis of the wing along the external margin, and arches to meet a slender one that runs along the under and inner edge. They are quite thin, slender, transparent, and of a snowy whiteness. The body of the male is of a lighter red than the body of the female, and not near so large.”

To Dr. Garden’s description, Mr. Ellis, in an account of the male and female Cochineal insects, accompanied with drawings, &c., (in the 52nd Vol. of the Philosophical Transactions,) adds; that “the female has a remarkable proboscis, or awl-shaped papilla, arising in the midst of the breast, which Linnæus calls the rostrum, and thinks it the mouth. If so, (says Mr. Ellis,) besides the office of supplying it

with nourishment during the time of its moving about, it is the tube through which the fine double filament proceeds, with which it forms its delicate web, in order to accommodate itself in its torpid state, during the pregnancy, till the young ones creep out of its body, shift for themselves, and form a new generation."

"In this torpid state the legs and antennæ grow no more, but the animal swells up to an enormous size, in proportion to its minute creeping state. The legs, antennæ, and proboscis, are so small with respect to the rest of the body, that they cannot be easily discovered, without very good eyes, or magnifying glasses, so that to an indiffererent eye it looks full as much like a berry as like an animal.

"As soon as the female is delivered of its numerous progeny, it becomes a mere husk and dies; so that great care is taken in Mexico where it is principally collected to kill the old ones while big with young, to prevent the young ones escaping into life, and depriving them of that beautiful scarlet dye so much esteemed by all the world."

It is proper here to observe, that there are two sorts or varieties of Cochineal; the best or domesticated, which the Spaniards denominate '*Grana Fina*,' or fine grain; and the wild, which they call '*Grana Sylvestra*.' The former is nearly twice as large as the latter, probably because its nature has been improved by the favourable effects of human care and of a more suitable nourishment, derived solely from the '*Cactus Cochinitifer*' during many generations, but it is only from the wild Cochineal, living naturally on some of the '*Opuntia*' in different parts of America, that the descriptions of Brown, Linnæus, and Ellis were taken. It must also be observed that the '*Grana Sylvestra*' are not only smaller than the others, *but that their bodies are covered by very fine white downy filaments*, which they spin to defend themselves against cold, rain, &c., in their wild state; but which adding to their weight whilst it yields no colour, contribute with other causes to render them less valuable.

In the month of January 1777, Monsieur Thiery de Menonville left Port au Prince in the Island of St. Domingo, for the purpose of procuring some of the living Cochineal insects in Mexico, and bringing them from thence to be afterwards propagated in the French West India Islands; an enterprize, for the expense of which four thousand livres had been allotted by the Government. He proceeded

by the Savannah to La Vera Cruz, where the most beautiful fine
 West Cochineal insects, were produced by Guazaco, Guazaco
 seventy leagues. Pretending ill health, he pretended to return on
 the banks of the river Magdalena, but instead of going thither, he pro-
 ceeded through various difficulties and dangers, as fast as possible
 Guazaco, when, after making his observations, and obtaining the
 requisite information, he affected to believe that the Cochineal insects
 were highly useful in composing an ointment for his pretended ail-
 ment (the gout), and therefore purchased a quantity of Nopals
 covered with these insects, of the fine or domesticated kind, and putting
 them into boxes with other plants, for their better concealment, he
 found means to get them away as botanic trifles, unworthy of notice,
 and being afterwards driven by a violent storm into the bay of Chi-
 peachy, he there found and added to his collection a living *Coccus*
 of a species which was capable of nourishing the fine domesticated
 Cochineal; after which, departing for St. Domingo, he arrived there
 with all his acquisitions, on the 25th September (in the same year)
 at Port au Prince where he began immediately to form a plantation
 of Nopals, and to take steps for propagating the two sorts or varieties
 of Cochineal, I mean the domesticated or fine, and the *Sylvestra* or
 wild, which last he found at St. Domingo, soon after his return,
 living naturally on the 'Cactus Pereskia.' But unfortunately for this
 establishment he died in the year 1780, through disappointment and
 vexation at seeing his patriotic endeavours so little assisted, and his
 services so sparingly rewarded by the Government. Mr. Thiers de
 Menonville's labours being thus terminated, the Royal Society of Arts,
 and Sciences at Cape François, having collected his papers, derived
 from them a treatise on the cultivation of the Nopals, and the
 breeding of Cochineal, &c. of which Mr. Berthollet has given an
 extract in the 5th volume of the *Annales de Chimie*, together with
 an account of his own experiments, for ascertaining the exact nature
 of *Grana Sylvestra*, produced at St. Domingo, compared with
 those from Mexico in dyeing.

either of these varieties of the Nopal, become almost as large as the fine or domesticated sort, and lose the greatest part of those fine downy filaments with which they are naturally covered, and which contribute to render them less valuable than the latter.

But, besides the advantage of affording the most suitable nourishment to Cochineal, the Nopals have another of very great importance, where these insects are to be raised as objects of commerce; which is that they are not beset with thorns or prickles. like most of the Cacti, and particularly the *Opuntia*, *Tuna*, and *Pereskia*, which by this circumstance render the insects nourished upon them almost inaccessible to any who might wish to collect them. Whilst the true Nopal, and that of Castile have none but soft inoffensive thorns, and the nourishment which they afford is at the same time so peculiarly well suited to the Cochineal, and especially to the fine or domesticated sort, that these last, though they can subsist on some, will prosper on no other species of Cactus, and indeed the wild sort, though found naturally upon several other species of *Opuntia*, are at present raised chiefly on the Nopals in Mexico.

The young insects, whilst contained within the mother, appear to be all connected one after the other, by an umbilical cord to a common placenta, and in this order, they are in due time brought forth as living animals, after breaking the membrane, in which they were at first probably contained as eggs. Being thus brought forth, they remain in a cluster under the mother's belly for two or three days, until disengaged from the umbilical cord; after which the females, for the only time of their lives, exercise their locomotive faculties by creeping to proper situations on the plant; and in doing this they are led by a wise instinct, to prefer the under sides of the different branches or articulations (as being most defended from wind and rain), where each attaches herself, by inserting her little tubular proboscis or mouth into the bark, and thus remains fixed to the end of life. By this insertion the female draws out for her nourishment the colourless mucilaginous juice of the Nopal, and soon becomes covered with a fine adhesive downy substance. The male acquires a similar covering, but quits it at the end of a month, and, in the shape of a little scarlet fly, jumps and flutters about, for the purpose of copulation, and having thereby secured a future progeny, he dies almost immediately after. But the female having other duties to perform, outlives the male another month; at the end of which she is ready to bring forth her

young, and this is the precise time for gathering those which are not wanted for breeding, and this is done by pressing the dull blade of a knife between the under surface of a branch of the Nopal, and the clusters of insects attached to it, which being thereby separated, fall upon cloths previously spread on the ground to receive them, and a sufficient quantity being thus collected, they are dipped (enclosed in a linen cloth or bag) into boiling water, and suffered to remain in it so long as is necessary for killing them, but no longer, lest the water should extract some of their colour. This being done, they are thoroughly dried by spreading and exposing them to the rays of the sun, by which they shrink so as generally to lose about 2-3rds of their former weight. This, which has been found to be the best method of drying the Cochineal, is now generally practised, though others were formerly in use: such as ovens, flat baking stones heated, &c.

Mr. Thiery de Menonville describes the male of the domesticated or fine Cochineal as perfectly similar to that of the wild in every respect excepting its size; nor does there appear to be any considerable difference between the females of these two varieties.

The domesticated female, instead of that downy covering, which enables the wild to bear inclement seasons, is only covered by a fine white powder or farina, serving in some degree as a defence against rain and cold, but not enough to enable her to remain abroad like the wild insects during the rainy seasons, which occur twice in every year. When these approach, the domesticated insects are all gathered, excepting only those intended for breeding a future stock, and these are preserved by removing the Nopals on which they are placed into situations where they are secured from wind and rain, or by raising frames over them, and covering them with thatch or matting, until the return of favorable weather; whereas the wild insects, being more hardy, as well as more prolific, when once placed upon the Nopals, would not only perpetuate, but multiply themselves without any further care to such a degree as to exhaust and destroy the plants, were they not all collected at the end of every two months, and the Nopals perfectly cleansed (by wiping them with wetted cloths) from the down and other animal impurities left on their branches. The Nopals become fit to nourish the Cochineal at the end of eighteen months from the time they were planted.

The quantity of fine or domesticated Cochineal which a single Nopal can nourish, usually weighs a third more than it could nourish of the wild.

These last have also the disadvantage of selling for a much less price, but in return they are gathered six times in each year; whilst the fine yield but three crops in the same space, their propagation being wholly suspended during the rainy seasons.

In Mexico it is thought necessary to keep the two sorts or varieties of Cochineal separated, at the distance of about one hundred perches from each, lest the males of the wild, impregnating the females of the other sort, should occasion a degeneration thereof,—a circumstance which seems to indicate that both sorts originated from the same stock, and that the domesticated is only an amelioration of the wild Cochineal, through the favourable effects of a more suitable nourishment, and of warm covering; and this is rendered the more probable, by Mr. Thiery de Menonville's observation, that the former are never found in the fields or forests of Mexico, nor indeed any where, but in the gardens and plantations of those employed in rearing them. But if the present size, appearance, and habits of the domestic Cochineal, were those which naturally belong to the insect, it might be supposed capable of maintaining an independent existence remote from the dwellings, and without the help of mankind, as it must have done before its properties were so well known, as to render it an object of human care and protection; and in that case some of this sort of Cochineal doubtless would have continued to subsist in their natural state, since the whole of a race, composed of so many minute individuals, could not have been taken and brought under the protection and dominion of man. Nor is it easy to explain why none of them ever are found in a wild state, but by supposing them to have been rendered effeminate by luxurious food, and by protection from inclement weather; and that consequently they have been enabled to lay aside their natural downy cloathing, as sheep lay aside their wool, when, after being removed to warm climates, they find it no longer necessary; and that their natural habits and means of self-preservation being lost, they are rendered incapable of subsisting without a continuance of the same fostering care which first occasioned their effeminacy; or if they ever do find means to subsist without it, they do so only by regaining their natural downy covering, and by returning again to their primitive habits, so as not to be any longer distinguishable from those who were never out of the wild state.

After the death of Mr. Thiery de Menonville the stock of fine or domesticated Cochineal, which he had multiplied in the garden at Port au Prince, was suffered to perish by neglect; but the hardier

wild sort, having found means to subsist, though neglected, was afterwards taken under the care of Mr. Bruley (substitute of the attorney general of that province), who, from the remains of Mr. de Mononville's establishment, formed a plantation for propagating and multiplying these insects, of which he sent a considerable quantity in the year 1787, to the minister of the French Marine at Paris, at whose request the Royal Academy of Sciences commissioned Monsieur Berthollet, and three others of its members, to cause proper experiments to be made therewith, which they accordingly did, under their own inspection, at the celebrated establishment (for scarlet dyeing) of the Gobelines near Paris: and from these experiments it appeared, that the 'Grana Sylvestra' of St. Domingo afforded colours by dyeing exactly similar to those of the fine Spanish Cochineal, allowing only after the rate of twelve ounces of the former for five of the latter. Mr. Bruley some time after sent to France a second parcel of the same Cochineal, produced from his plantation in the year 1788; and this being tried by the same Commissaries of the Royal Academy, though in different ways, produced nearly the same effects.

Very considerable differences of external colour or appearance occur in different parcels of the fine Cochineal; probably because the white farinaceous powder, with which these insects are naturally covered, is more or less washed off by the hot water in which they are killed by immersion, as well as by other circumstances which occur in the drying and packing. When this powder has been entirely removed, the insects appear of a chocolate colour, inclining a little to the purple, and are then called 'renigrida.' *Generally, however, so much of the white powder remains, especially in the little furrows which cross the insect's back, as occasions a greyish appearance, called 'jusepadda;' and sometimes indeed this powder so perfectly covers the Cochineal, as to render them all over white. This I remember to have been particularly the case of a parcel which a friend of mine had purchased, and which was refused by several dyers, to whom it had been sent, from a persuasion of its having been fraudulently covered by white lead, or some other metallic calx intermixed with it, to increase the weight, and one very eminent dyer alleged, that he had formerly seen and tried a similar parcel, and that the white powder had been found to consist principally of a preparation of mercury.* That I might be enabled to ascertain whether an opinion so unlikely had any foundation, my

friend caused several ounces of this powder to be separated from the insects by sifting, and having tried it sufficiently, *I found it to be entirely of an animal nature, and apparently nothing but the farina which naturally covers these insects.* It even yielded a considerable portion of the true Cochineal colour, and dyed good scarlets in the usual way, though it probably was assisted by some of the limbs, or other parts of the bodies of the insects, separated by rubbing in the sieve; though I am persuaded that a part of the colour in question naturally existed in the farina or white powder itself; and if this be the case, it would be highly advantageous to contrive means for killing the Cochineal, without washing off any part of the powder in question, which might, I think, be done by putting them into tinned vessels, made so as to shut closely, which might be plunged into boiling water, and withdrawn at a proper time, without letting a single drop of it come into contact with the insects, or carrying off any of the powder in question. And, perhaps, this method might be used with advantage, even if it should be found that no colouring matter resides in the white powder, since it is difficult to conceive, that the Cochineal can be plunged into boiling water, so as to wash off the powder entirely (as is frequently done), without a loss of some part of the colouring matter contained in the bodies of the insects themselves.

The true original 'Grana Sylvestra' seems to have been very different from what is at present sold under that denomination in this kingdom, and which has the appearance of a dry powder with many small lumps or fragments of something which had been previously formed into a cake or a dried uniform mass. It affords indeed nearly the same species of colour as Cochineal, but in a much smaller proportion: six pounds being necessary, according to my experiments, to dye as much cloth, as one pound of the fine Cochineal; whereas the true Grana Sylvestra are represented as yielding at least *half* as much as the fine, and they sell for at least half the price in some parts of Europe; whilst here the substance so called, and which has not the least appearance of any insect, sells at present for less than an eighth of the price of fine Cochineal. Probably it is composed of the white downy substance which the wild insects are represented as leaving in great abundance on the Nopals, and other excrementitious matters deposited by them joined to fragments, broken limbs, dust, &c., of the insects themselves, and perhaps with an addition of

some vegetable matters, all beat up into one uniform mass. Something of this sort was formerly practised even with the true Cochineal, according to Dr. Brown, who says—'The Cochineal insects used to be prepared, by pounding them, and steeping the pulp in the decoction of the *texuatla* (a species of *Melastoma*, as he supposes), or that of some other plants, which they observed to heighten the colour. This,' continues Dr. Brown, 'was left to settle at leisure, and afterwards made into cakes, and dried for the market.'

Probably the true *Grana Sylvestra* are what are sold in this country under the name of '*Granillo*,' which appears, as the name indeed imports, to consist of insects somewhat smaller than those composing the fine Cochineal, and therefore in that respect answers to the best authenticated descriptions of the wild Cochineal.

It had been generally believed that the Cochineal derived its colour from the red or crimson fruit of the *Nopals*, and other species of *Opuntia*, and I was formerly induced by this opinion to make various trials with the fruit of the *Cactus Opuntia* for dyeing, instead of Cochineal.

They all indeed proved unsuccessful, and I attributed this want of success to their want of that kind of animalization, which the vegetable red colour was supposed to receive when eaten and assimilated by the insect; and I thought it probable, as indeed others have done, that many vegetable colouring matters might be equally improved in the same way, and that perhaps, instead of insects, it might be advantageous to employ large animals for this purpose. It is, however, now certain, from the observations of Mr. Thiery de Mononville, and from other well attested relations, that the Cochineal insects do not feed on the red fruit of the *Cactus*, but upon its branches, or articulations to which they adhere, and which contain nothing like a red juice; and that they sometimes live, propagate, and preserve their colour on those species of *Cactus* which do not bear red-coloured fruits: consequently the colour of these insects does not result from that of their food, but from their particular constitution and properties.

The very great demand for Cochineal, almost immediately after it had been made known in Europe, caused a very rapid multiplication of it in the Spanish American settlements. It appears from Acasta's statement, that so early as the year 1587 there came to Spain, by a single flota, no less than 5670 Arobas of fine Cochineal, which, at the

rate of 25lb. each, weighed 141,750 pounds; and the common annual importation, as stated some years since by the Abbé Raynal, amounted to 4,000 quintals or 400,000lb. weight of the fine Cochineal, 300 quintals of the Grana Sylvestra, 200 ditto of Granillo, and 100 of Cochineal dust, which were computed to have sold for a sum equivalent to about nine millions of French livres; without reckoning considerable quantities sent directly from America to the Philippine Islands, for supplying a considerable part of Asia. The European importations have, however, been considerably increased, during several of the last years. Since, according to very good information, which I have received, the quantities of fine Cochineal brought to Spain in the years 1788, 1789, and 1790, amounted to eleven thousand bags, weighing 200lb. each, and making together 2,200,000lb. weight; and between the 1st of January 1791, and the 1st October in the same year, the importations had exceeded 2,000 bags.

It must, however, be observed, that the importations during these years were somewhat greater than usual, because an advance in the price of Cochineal in Europe had induced the holders of it in America to send their stocks more speedily to market, in order to avail themselves of the higher prices; and from accurate calculations, I think it may be concluded that the average quantity of fine Cochineal annually consumed in Europe, amounts to about 3,000 bags, or 600,000lb. weight, of which about 1,200 bags or 240,000lb. weight, may be considered as the present annual consumption of Great Britain. A greater quantity comes indeed into the kingdom, but the surplus is again exported to other countries. These 1,200 bags may be supposed to cost £180,000 sterling, valued at fifteen shillings per lb., which has been about the average price for some years past.

According to Don Antonia Ulloa, the greatest quantities of Cochineal are produced at *Oaxaca*, *Tlascula*, *Chulula*, *Nueva*, *Gallicia*, and *Chiapa*, in New Spain, and at *Hambatio*, *Loja*, and *Tucuman* in Peru.

About six years ago, Dr. James Anderson, physician general on the Company's Establishment at Madras, persuaded himself that he had found the true Cochineal insect subsisting naturally on a species of salt grass in that part of India, and some parcels of a dried insect (probably of the *Coccus* kind, but more like the *Kermes*), which he mistook for the true *Coccus Cacti*, were sent by him to this country, of which I made several trials, at the request of a friend (as others did), and found to be neither of the same species, nor possessed in any

degree of that particular colouring matter for which the Cochineal insect is so highly valued; though in their dried state they had nearly the same external appearance, excepting their size which was considerably less than that of the true Mexican Cochineal; but upon rubbing them in a mortar, I soon perceived, that instead of breaking into a dry powder like Cochineal, they could only be beat into a kind of unctuous paste; nor would any degree of drying, short of combustion, overcome this unctuous quality, or render them capable of being rubbed into the form of a powder; and in point of colour, there was a more essential difference, since they produced nothing better than a chocolate brown, by the means usually employed, for dyeing scarlet with Cochineal, nor indeed by any other means. This chocolate colour proved, indeed, sufficiently durable on wool, but it may be dyed so cheaply by other matters, and indeed these insects yielded so little of it, that they never can be worth collecting as a dyeing drug.

It occurred to me, however, on this occasion, that though Dr. Anderson had failed in his expectation of finding the Cochineal in a country where it probably never existed (the genus of plants on which it is alone fitted and destined to live, having been originally produced only in America), yet it would not be very difficult to convey both the insects, and the Cactus Cochinillifer (their natural food and habitation) to the East Indies, and there propagate both, so as in a few years to obtain from thence ample supplies of a drug so highly important in a great manufacturing country, and for which nearly £200,000 sterling, are annually paid by this to the Spanish nation, especially as great advantages in this respect would result from the cheapness of labour and subsistence in the East Indies; and considering moreover how much the quality of the indigo of that country had been improved, and the quantity increased within a few years, through the measures taken so opportunely for these purposes by the East India Company, at a time when the usual supplies of the article from other countries had been greatly diminished.

Similar ideas on this subject occurred, or were suggested, to the Directors of the East India Company, who, in the spring of the year 1788, procured from His Majesty's garden at Kew (through Sir J. Banks, Bart. P. R. S.) some of the true Nopal plants, two of which were sent out by the Bridgewater, during that season, to Madras, and put under the care of Dr. Anderson, where they have since been multiplied to several thousands, and been transplanted

thence to Bengal and St. Helena, in order that a sufficient stock might be in readiness to receive any Cochineal insects which should arrive; a Committee of the Directors having previously reported as "their opinion, that it be recommended to the Committee of Correspondence to take such measures as they shall judge best suited for procuring from America a quantity of the Cochineal insects, with a view to the introduction of the same upon the coast of Coromandel."

Unfortunately, however, it does not appear that any measures have yet been effectual in procuring the domesticated insect, or even the *Sylvestra*, though this last exists in Jamaica (as does the true Nopal) and in many other accessible parts of America, and probably in more than ordinary perfection in Brazil; at least I made trial, about the year 1787, of some which had been sent from thence by the way of Lisbon, and which yielded *full* as much colour, and of as much beauty, as half its weight of the "*very best fine Cochineal*," and until this last can be obtained, would it not be advisable to make trial of the other, which, by being properly nursed, and nourished upon the true Nopals, might perhaps in a little time improve so as to supersede the necessity of seeking any further.

(See Bancroft upon Permanent Colours.)

THE COCHINEAL PLANTS AND INSECTS.

Some months ago information having been communicated to Dr. Wallich by a French visitor, and Dr. Wallich having reported the circumstance to the Agricultural Society, that the true Cochineal or *grana fina* of Mexico had been introduced into the Island of Bourbon, and was now propagated there in the Government Botanic Garden, the Society solicited the aid of M. Bedier which was kindly given to procure Cactus plants with the Cochineal upon them from Bourbon, and Dr. Wallich at the same time wrote to M. Richard, the Director of the Botanic Garden at Bourbon, to request him to take charge of the Commission. The result has been that M. Richard, by direction of the Island Government, has forwarded two boxes of Cactus *Opuntia Cochinchinifer* with the insect upon them in the *Robert le Diable*, and they are now safely lodged in the Company's Garden. The plants were very carefully packed in glazed boxes, one of them with an opening window, the other closed, but having three air holes, and though the earth in the

boxes was kept rather too moist, and one or two of the plants perished in consequence, there is a sufficient supply of both plants and insects in a healthy state to ensure their propagation. It turns out, however, as was apprehended, that the insect is not the *grana fina*, but merely the *grana silvestre* which is already so abundant in various parts of India. Simultaneously with this supply another has been brought with equal success by Captain Charlton of the Bengal Service in the *Scavostris*, from the Cape of Good Hope, which upon inspection proves to be also of the *silvestre* species, though Captain Charlton was induced to suppose it otherwise from the circumstance of the insect having been introduced there about four years ago by Dr. Tappe direct from Mexico upon the Cactus *Cochinillifer*, and the original plants dying it was distributed upon the *Opuntia Vulgaris* of Miller (or Cactus *Opuntia* of Linnæus), upon which it is found to thrive very well in the neighbourhood of Cape Town. They do not seem to be aware at the Cape that the *silvestre* Cochineal is a native of Mexico, as well as the *grana fina*, and very common in the neighbourhood of the sea, being therefore much more accessible to a stranger than the more valuable species which is only reared in the central parts of the province of Oaxaca. Much praise is due nevertheless to the liberality of the Government of Bourbon, and individually to M. Bedier, M. Richard and Captain Charlton, for having procured us these supplies in the full belief of their having been of the genuine Cochineal.

We will take the opportunity of mentioning a more valuable acquisition for which the Agricultural Society is also indebted to M. Richard, who has sent up in the *Robert le Diable* 18 boxes of Sugar-cane, consisting of 550 cuttings of Batavia cane, 18 of red, said to be of the *Otaheite* species, and 10 of a striped species. The boxes are now in the garden, and their contents are reported to be on the whole in very good order, having been carefully prepared and packed in black dry sand covered with moss, and well secured in small wooden cases.—*Courier*, January 29th, 1838.

To the Editor of the Bengal Hurkaru.

SIR,

On glancing over your paper of the 30th ultimo, this afternoon, the above heading attracted my notice, and I read greedily the article

on Cochineal, as extracted from the *Courier* of the 29th. Although being unwell, I was anxious to see the insect from Bourbon and the Cape, and proceeded to the Botanical Garden.

I was amply repaid for my trouble, as personal inspection has put it in my power to place my opinion in direct opposition to that given in the *Courier*.

My observations lead me to this result,

1st. That the insect upon the Cactus *Opuntia Cochinitifer*, in the two green painted boxes, is the true *grana fina* of Oaxaca.

2nd. That the insect upon the common prickly Cactus in the blue painted box is the wild or *Grana Silvestra*, of which we have abundance in this country.

I should not take the liberty of advancing an opinion thus publicly, as I could very easily have referred the question to the judgment of others, but there is frail prospect of preserving the living insect for any length of time; and I shall be equally willing to stand publicly convicted if in a committee of judges conversant with the subject I am found to be wrong. Mean while, I beg leave to suggest the propriety of having a meeting convened immediately, and I will stake my opinion on the following test:

1st. The young insect in the blue box will greedily attach itself to the common prickly Cactus growing every where.

2nd. The young insect in the green boxes, will creep over the common prickly Cactus in search of *Cochinitifer*, but will die in a day or two.

3rd. The insects (young) both the true *fina* and *silvestra*, will creep over the Cactus *Opuntia Cochinitifer* of the Botanic Garden, but they will not touch the leaf; (i. e. if it be the same description of Cactus *Cochinitifer* obtained by me in 1827.)

4th. The white powder on the insects in the green boxes, and the white silky coat on the insects in the blue boxes; indicate most distinctly their commercial characters.

In conclusion I trust the question is of sufficient importance to the interests of commerce to call for an immediate inquiry, and I shall rejoice if this short notice be the means of devoting attention to what might have been neglected from the report already published.

Your obedient servant,

JOHN BELL.

Garden Reach, Feb. 4, 1838.

P. S.—Since writing the above, I find on referring to the notice in your paper, that the *true* or *domesticated* Cochineal, is from *Bourbon*. The *silvestra* or *wild* is from the *Cape*.—J. B.

To the Editor of the Bengal Hurkaru.

SIR,

As the information respecting Cochineal in the *Courier* of the 29th ultimo, upon which Mr. Bell has commented in your paper of this morning, was furnished by me, I feel myself called upon to state the grounds on which I gave so decided an opinion, that neither of the two supplies of Cochineal insects recently received from Bourbon and the Cape, and now in the Botanic Garden, was of the species distinguished by the name of *grana fina* and known as the Cochineal of commerce.

I have seen both species, the *fina* and the *silvestre* in large quantities reared in a garden at Vera Cruz for experiment and transmission to Spain, by a Spanish gentleman, who gave me free access to his garden and explained to me the result of his observations, and I believe I am the only person in India who has ever seen the *grana fina* alive. I have also seen the wild Cochineal upon the Cactus plant in various places, the sandy coast of Vera Cruz, Campeachy and Bengal, and every where it has been a subject of attention with me. These opportunities and various experiments of my own will account for the confidence with which I offer an opinion upon a subject of some nicety, the distinction between the two species, a subject on which many have been deceived who have had the advantage of ocular experience.

On hearing of the arrival of the plants and insects from Bourbon, I made an appointment with Dr. Wallich to inspect them in the state in which they were landed, and having examined with him very carefully, by the aid of a magnifying glass, the contents of the two boxes, and also of a third box from the Cape, I communicated the result to the *Courier* as a matter of interesting information. Both the Cape insect and the Bourbon insect were found to have a white silken coat (the *sure* characteristic of the *silvestre*) the only difference in their appearance being that it was less disturbed on the former than on the latter, and that the Bourbon insects, particularly on one plant, were more healthy looking and larger than the others. What Mr. Bell has taken for white powder on (rather *about*) the latter, seemed to me to be nothing more than minute parts of this silky substance

detached. Exactly the same appearance I have seen on a Cactus covered with *silvestre* Cochineal in the garden at Kew, and also in an experimental plantation of some extent at Campeachy, which so far deceived me that I eagerly availed myself of the proprietor's permission to take away a few lobes of the plant covered with insect and carried them to England, believing, when I took them, the Spaniard's assurance, that I was in possession of the valuable species, the true *grana fina*. Close observations, however, soon convinced me of the contrary, and when, after drying some of the produce, I had it tested by a professional person in London, the intensity of the dye was pronounced to be only in the ratio of two to five compared with the Cochineal of commerce, weight for weight. From that stock, however, which I deposited in the Botanic Garden at Chelsea, I brought out a supply to Bombay in 1821, and a second followed the next year, both which arrived in a living state; but the identity of the species with that already common in India, rendered it of no value in this country.

Besides the powdery appearance noticed by Mr. Bell on the Bourbon insect, he gives another reason for believing that insect to be of a different species from the Cape insect—a difference in its habits and a disinclination to attach itself to the same varieties of Cactus. But this remark is inconsistent with the observations of my Vera Cruz friend, as well as of Humboldt and a Mexican author of a Treatise on Cochineal,—who all concur in stating the habits of the wild and domesticated species to be same, and that the plant that will feed one insect will feed the other. And with respect to the young insects of the Cape stock dying in a day or two, on plants they do not like, I know from experiment that the young insects of the *Silvestre* species will live 12 or 14 days (or more) after their birth, without any food at all. Indeed, it is doubtful if the Cochineal insect of either species requires or is capable of taking nourishment until it attaches itself permanently to the Cactus leaf.

I agree, however, with Mr. Bell, in considering the point of sufficient importance to merit the investigation of a special committee of judges, if competent persons can be found, and I should be heartily pleased to find myself mistaken in the opinion which I have formed. At any rate the insects should be propagated until the test of the dyer shall have proved the quality of the coloring matter.

Your obedient Servant,

Calcutta, February 7, 1838.

G. A. PRINSEP.

DISTINGUISHING CHARACTERS OF THE
COCHINEAL INSECT,
KNOWN IN COMMERCE AS
The "*Grana Fina*" and "*Grana Sylvestra*"

"The insects are killed by being thrown into boiling water, placed in ovens, or dried in the sun. Those which are killed by *the latter method fetch a higher price, from the white powder, covering the insect, being still retained*, and thus preventing, in a great measure, the adulteration of the article.

ENCYC. AMERICANA.

"The Cochineal insect is of two species: the *Grana Fina*, or fine Cochineal, and the *Grana Sylvestra*, or wild Cochineal. The fine Cochineal differs from the wild *not only in size, but also in being mealy and covered with a white powder*; while the wild one is enveloped in a *thick cottony down*."

CLARKE'S CYCLO. OF COMMERCE.

"When dried they resemble small grains, scarcely so large as a pepper-corn, ovate, convex above, plane below, transversely furrowed, externally blackish brown, *but as if dusted with a white powder*."

PENNY CYCLOP.

For report on the quality of Wild Cochineal compared with that of Mexico in its domesticated state, vide Transactions of the Agricultural Society of Calcutta, vol 3.

(*Cacti upon which the Cochineal is said to obtain nourishment.*)

TO JOHN BELL, ESQ.

MY DEAR SIR,

I have much pleasure in sending you eight species of Cactus, and shall be glad, if they can be of any service to you. I might have added several others, but as they have never been used for feeding the Cochineal insect, I suppose you do not require them.

I remain, my dear Sir,

Yours truly,

Serampore, the 7th Feb. 1838.

J. VOIGT.

1. *Opuntia Dillenü*, Haworth. (Cactus Dillenü, Ker. in Bot. Reg. vol. 3, tab. 255,—*C. indicus*, Roxb. Flor. Ind. Q. p. 475, Beng. Nag-phunee.) "Upon this plant the Cochineal insects, lately brought from America, thrive and multiply abundantly." (Roxb. l. c. p. 476.)

2. *Opuntia triacantha*, D. C. (Cactus triacanthus, Willd.) I have never seen the flowers, but the plant was sent to the late Dr. Carey under that name from the Hon'ble Mr. Herbert.

3. *Opuntia cylindrica*, D. C. (Bot. Mag. vol. 61, f. 3301, Cactus cylindricus, Lam.)

4. *Opuntia cochinillifera*, Mill. dict. (Cactus cochinillifer, L., Bot. Mag. vol. 54, tab. 2741-42, Le Cactier de Campêche.)

"We believe, it must be allowed, that our plant, which was named by Liandus, and has almost universally been called the Cactus Cochinillifer, is not that which produces the best Mexican Cochineal." (Hooker in Bot. Mag. l. c.)

"He" (Thierry de Menonville) "says of it, from his own experience, that it may be usefully employed for rearing the 'Cochenille Sylvestre,' and may even support a small quantity of the fine kind." (Hooker, l. c.)

Opuntia Tuna, Mill. dict. (Dill. elth. f. 380, Cactus Tuna, L.) "*Cochinillæ speciem valde probatam nutrit ex Bonpland.*" (De Candolle, prodr. vol. 3. p. 472, no. 13.)

"Thierry de Menonville, who so courageously procured the Cochineal insect and the Cactus from Guaxaca, and transported them to St. Domingo, and who unquestionably had the best means of determining the kinds of Cacti, cultivated for the insect, describes particularly three sorts, on which it may be reared and cultivated to advantage.

a. The Cactus Nopal, upon which alone the Cochineal insect is reared in Mexico, both the fine and the common Cochineal (*la Cochenille fine et Sylvestre*), although there are throughout the country many other kinds of Cactus. The two following therefore, it is presumed, are employed in St. Domingo.

b. The 'Cactier Splendide,' which may be used to equal advantage with the former; and

c. The Cactier de Campêche.

Of these the first, as far as can be determined by description, for the writer had never seen the flower or fruit, is the Cactus Tuna of

Linnæus. (C. Coccinifer of Decandolle in his work 'Plantes grasses.')

The second appears from the account to be very similar to the former, but larger in its joints (some of them thirty inches long) and very glaucous. (Hooker, l. c.)

The third is *Opuntia Cochinillifera*, (No. 1.)

Baron Humboldt asserts, that *Cactus Cochinillifer* is not the individual of the Mexican *Nopaleries*, which he makes a new species, under the name of *Cactus Bonplandii*. Decandolle, however, as well as Sprengel consider the latter, identical with *Opuntia Tuna*.

"At Rio de Janeiro, when that place was visited by the Chinese Embassy under Lord Macartney, there were considerable plantations of *Cactus* for rearing the Cochineal, and the plant, which is the *Opuntia Tuna*, is represented on the 12th plate of the Atlas of that work. From all this, we think it may be inferred, that in Mexico and Brazil the *Opuntia Tuna* is the favourite food of the Cochineal, and that in the West India Islands the *O. Cochinillifera* is employed by the natives, and answers the purpose sufficiently well." Hooker, l. c.

6. *Opuntia ferox*, Haworth. (*Cactus ferox*, Willd.)

7. *Opuntia nigricans*, Haworth, (*Cactus Tuna Nigricans*, Bot. Mag. vol. 38, f. 1557. *Cactus pseudo-cochinillifer*, Bert. exc. p. 11.)

8. *Cereus hexagonus*, Haworth. *Cactus hexagonus*, L. Bot. Repos. vol. 8, f. 513.)

The latter has no reference to the Cochineal insect, but as my mallee has brought it, I have named it.

FURTHER NOTICES ON COCHINEAL.

Hints for securing the Propagation of the Cochineal Insects.

By G. A. PRINSEP, ESQ.

[Read 14th February, 1838.]

To JOHN BELL, ESQ.

MY DEAR SIR,

I promised Dr. Wallich, at his request, a few hints for securing the propagation of the Cochineal Insects lately received; and as I understand you are now the custodian thereof I will address them to you. Supposing that you already understand the treatment of the

Cactus, I will only say with respect to the plant, that a wounded part put into the ground will rot up to the joint unless healed before planting, which requires but two or three days. With respect to the insect, however, there is much precaution necessary to prevent the entire loss of the generation when you have but a very small quantity, as the male insect, when in activity and mature is a very delicate little fly easily blown away. By want of proper attention to this I lost the generation twice at Bombay. I would therefore suggest that you have the original lobes and also a quantity of fresh ones for the Insect to breed upon protected in some way from wind, but taking care to give them light. In Mexico the breed is preserved in the rainy season by keeping a quantity of Cactus lobes covered with insect under sheds, and a whole generation takes place (four months being the period) before they are put out into the field again. The way in which the insect is communicated to the plants is by putting some of the mothers, when they begin to shed their young, in little bags of the net coating of the palm tree attached to a Cactus leaf by a thorn. The mothers may be detached from their own plant when they arrive at that state, and will not die till they have shed all their young.

Yours faithfully,

G. A. PRINSEP.

February 9th, 1838.

SECRETARY'S REPORT,

(No. 1.)

Upon the Cochineal committed to his care by the "Agricultural Society of India," in conformity with a recommendation of the Committee, confirmed by a General Meeting of the Society on the 14th February, 1838.

[Read 14th March, 1838.]

On the 5th February, 1838, I received from Dr. Wallich three plant-chests, two of which contained some leaves of Nopal with the living insect, forwarded to the Agricultural Society of India by Monsieur Richard, Superintendent of the Botanical Garden at the Isle of Bourbon, under direction from the Government of that Island, as communicated in that gentleman's letter to Dr. Wallich, dated November 9th, 1837; and one chest containing some leaves of Nopal with the living insect, presented to the Agricultural Society of In-

dia by Captian Charlton, who brought them from the Cape of Good Hope on the "Sesostris." (See his letter to Dr. Wallich, dated January 23rd, 1838.)

The Bourbon Plant and Insect.

I. I found the leaves of the Bourbon Nopal to be all partially injured by long confinement in the chests, and the damp which proceeded from keeping the soil moist, and most of the insects dead; fifteen only appeared alive, and although some of those dead had previously propagated, the young all perished. Only four leaves of the Nopal were alive, and the healthiest insects were unfortunately attached to an upper lobe, which was too young and sickly to take root, and they had not attained sufficient age to be detached. I therefore made a bamboo frame, on which I placed a few leaves of the following species of Cacti, viz. :—

- 1 Cactus Indicus.
- 2 Cactus Cochinillifer.
- 3 Cactus Tuna.
- 4 Cactus Hexagonus.
- 5 Cactus Spinosissima.
- 6 Cactus Pereskia.

Each of these leaves I inoculated with parts of the Bourbon plants most injured which had still a few of the insects, placing the least injured leaves without being cut in such position as to secure an easy transit to the fresh Cacti, if the insects on them should propagate; and having left them undisturbed for fourteen days, I carefully examined each of the leaves, and obtained the following result. The young insects had attached themselves to the above Cacti, Nos. 1, 2, 3 and 6, none appearing on Nos. 4 and 5.

Finding the leaves had lost somewhat of their freshness, I had them re-planted in the original chests, to secure the re-propagation of this young colony, before committing them to beds in the garden. At present there is an abundant supply of young insects upon the Tuna, Indicus, Cochinillifer, and Pereskia, but whether they will come to maturity on any of these species my next Report will better demonstrate. Leaving one Bourbon plant in the box, I transferred the remaining three, with only two insects upon them, to the open air, and touching the Cactus Cochinillifer, to admit of the young creeping upon the latter, should the mothers have been impregnated.

The Cape Plant and Insect.

II. One healthy plant was received in the original chest, covered with insect; three more plants were in the box, but upon them no Cochineal was found. The former is the *Indicus* common in this country, but much thicker and more juicy: the other plants had no spines.

Precisely the same method of treatment was observed as with the Bourbon plants, and the same variety of Cactus placed within range of the insects. The result is, that they have attached themselves to the

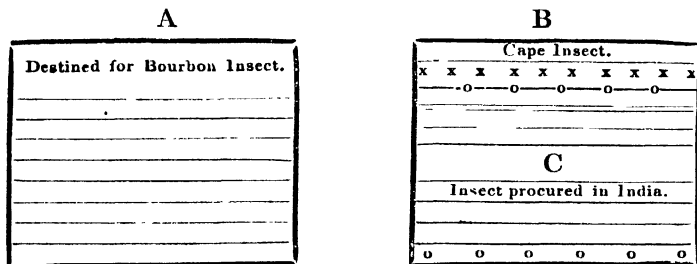
Indicus,
Cochinillifer,
Tuna,
Hexagonus,
Pereskia,

but I am not prepared to say on which they will come to maturity.

The Insect already in India.

III. I procured a plant of the Cactus *Indicus* growing on the road side between Cossipore and Dum-Dum, covered with the wild insect, with which I inoculated a small plantation of the *Tuna* and *Cochinillifer*. The young are now creeping over the leaves—none have yet attached themselves to the plants.

Seeing the Bourbon and Cape Insect readily attach themselves to the *Tuna* and *Cochinillifer*, I have formed a Nopalerie as follows:



The plantation A consists of seven bamboo sheds running parallel to each other from end to end, with moveable hoogla covering, which is taken off and applied according to the state of the weather. Each

shed contains sixteen plants of the *Cactus Cochinitifer* and *Tuna* alternately, and this plot is designed for the reception of the *Bourbon* insect, if it propagates on the plants now in the chests.

B consists of one shed, or as above described, containing twenty plants of the *Tuna* and *Cochinitifer*, alternately placed. It is intended to impregnate these plants with the Cape insects. There are also two rows of *Cactus* as above, containing twenty plants, exposed to the open air. These are designed to compare the effect of exposure upon the insect.

C consists of five lines of *Cactus Tuna*, *Indicus*, *Cochinitifer*—four of which are exposed, and one covered in: at one side and at the top—containing in all one hundred plants, which have all been inoculated with the wild insect procured near Cossipore. Besides these, there is a reserve plantation of the *Cactus Tuna*, containing two hundred plants, for the purpose of extending the cultivation, should the insect be easily propagated on this description of *Cactus*.

My next Report will demonstrate which of the various *Cacti* under trial have been found most suitable. At present I can only say, that the plant brought from *Bourbon* is NOT the *Cactus Cochinitifer* of the Honorable Company's Botanic Garden, and that it is a different species from any I have yet seen in India.

JOHN BELL.

March 13th, 1838.

*Instructions for the Cultivation of the NOPAL, and Rearing of
the AMERICAN COCHINEAL.*

Published for the use of the Agricultural Community by the "Royal Cadiz Economical Society of the Friends of their Country," in the year 1825.

TRANSLATED FOR THE AGRICULTURAL SOCIETY OF INDIA BY
H. PIDDINGTON AND JOHN BELL.

[Submitted at a General Meeting on the 14th March, 1835.]

INTRODUCTION.

The Royal Economical Society of Cadiz had no sooner received the *Grana Fina* *Cochineal* from America, than it exerted all its care to naturalize this precious Insect in the Peninsula. Five years of minute and continued observations, during which we have seen fifteen genera-

tions and the insect multiplying itself in infinite numbers, and our having well observed during this epoch all the influence which the seasons and atmospheric changes exercise on the insect in all the periods of its life, lead us to believe that the Society has obtained the fruits of its labours in acclimating in the Peninsula the American Cochineal, which may in a few years hence become an inexhaustible source of public wealth*.

The facility and abundance of the growth of the Nopal or *Higo-de-Tuna* (Tuna fig) with its vigorous vegetation, almost too without culture, prove that this plant can support numerous generations of Cochineal insects, since it may be naturally supposed that where the plant flourishes so well, the insect would equally do so, when due care is taken of both.

Upon these grounds we have endeavoured to introduce the rearing of the Cochineal in the villages in the neighbourhood of Cadiz, and with the same views the mother insects have been offered to different Economical Societies, and have been sent to those of Seville, Murcia, and Valentia—the fine climates of which seem well adapted to the experiment. The Economical Society of Cadiz reserves also an abundant nursery to supply new demands, and to repair any accidental losses of experimentalists.

But to give to this important enterprize all the encouragement required, it was necessary to reduce the precepts for the rearing of the Cochineal to a few clear and simple rules, which would serve as a guide to the cultivator, relieve him of his doubts and fears, assist his operations during the life of the insect, and shew him the different methods of killing it in such manner that the preservation of its brilliant colour might recompense him for his trouble. Such has been the desire of the Society, but to realize it fully, it conceives it necessary to be assured that the Nopals which grow so abundantly in our country were equally as fit for rearing the Cochineal as those of America, and to make some other observations not less important towards assuring the success of the undertaking.

If indeed it were only necessary to detail the methods employed by the Indians of Mexico in rearing the Cochineal, it is certain that the work of Thierry de Menonville, the valuable memoir published by the Curate of *Cobules*, in Guatemala, by Senor Alzate in Mexico, and some unpublished ones in the possession of the Society, would

* See Note at the end.

have furnished it with abundant materials for this purpose, and for the gratifying of common curiosity; but there was reason to fear that the methods adopted in the New World might not produce the same results in our climate, or that the active imaginations of our cultivators might be alarmed at the multiplied difficulties and risks which the Indians of Mexico meet with in this pursuit. As an instance we may mention, that there is a sort of Cochineal called the *Silvestre*, or wild Cochineal, by the Americans, and that Senor Alzate has doubts if it is different from the *Grana Fina*, or only a variety of the same sort*. It is certain that there was an insect of this sort amongst those received at Cadiz, but it has nevertheless been frequently seen and remarked upon in the Cochineal reared here. The two insects present the same characters in their primitive stages, so that during the first epoch of their lives they are not to be distinguished; but in the latter ones the *Silvestre* is smaller than the *Grana Fina*, and each individual is enclosed in a small covering or tunic, very thin and delicate, from which it cannot be separated. The two insects however produce the same colour, and it is well known in America that the Indians employ no other than the *Silvestre* for their dyeing processes†.

It may be concluded from these observations that the *Silvestre* is derived directly from the *Fina*, and that their accidental differences may arise from debility at the birth of the former, or from some diseases peculiar to it in the first stages of its existence—a circumstance not uncommon amongst animals, and which powerfully influences not only their appearance, but also their habits, size and vigour.

Nevertheless the cultivators of Oaxaca sedulously destroy the *Silvestre*, saying, that it weakens and destroys the Nopals. We have not yet in this country sufficient data to decide positively on the question of its origin, but we can affirm that our Cochineal does not give birth to the numerous insects which destroy the *Fina*, and that the affirmation of Senor Presas‡ that one insect engenders several others,

* Memoir on the Cochineal insect, by the Author of the Mexican Literary Gazette.

† This is correct as far as relates to the brilliancy of the precipitate obtained by muriate of tin as compared with the finest Cochineal procurable in Calcutta, but then it is only true of the *fresh* *Silvestre* insect. From a series of experiments made some years ago, I found that it contains besides the colouring matter, a blackish putrisable animal substance, which soon alters the colour if kept long, rendering it dull. Hence the failure of all the attempts to make cake Cochineal.—Note by H. Piddington.

‡ Directions for the cultivation of the Nopal, or Tuna fig, and for rearing Cochineal by Don Jose Presas, p. 16, art. vi.

distinct from its kind and differing from each other, is a phenomenon hitherto unknown in Natural History.

Experience has shewn that at Cadiz the Cochineal is free from the multitude of insects which devour it in its native country. We know nothing here of the *Cochinto*, the *Pintito*, and the *Progita*, and of a host of other vermin so dreaded by the cultivator in America, and which are indigenous there, and which may probably never appear in Spain. We must not however suppose that the Cochineal will never have enemies; it is probable that there are already some in the field. We know that herds of the gallinaceous tribe, and those which live upon insects—such as the fly-catchers and snails—some species of ants and spiders are terrible enemies to this precious Insect. The cultivator must then carefully watch his Cochineal, and experience will teach him what are the enemies he has to fear and destroy.

The Cochineal has been tried on all the varieties of Nopal growing in the neighbourhood of Cadiz. They seem to thrive equally, and to afford colour in proportion to their nourishment and growth. The little culture which they receive much improves their quality; it deprives them of thorns, and renders the epidermis of the leaf much more delicate, which allows the insect to fix itself to it much more advantageously.

From long experience we may say that though the rearing of the Cochineal requires much care and vigilance, it does not require any great outlay or hard labour. Sheltering the young Nopals from rain, storms, sharp cold, and enemies which may attack them, without depriving them of the sun and air in fine weather, are the principal rules to be attended to in their culture, which is clearly and simply described in the following instructions.

By due attention to the general rules here laid down, the cultivator will be able to manage by himself, and from experience he will learn to simplify his operations without endangering his returns. The Nopals being once properly planted and sheltered from the weather, a single man can take care of three hundred plants, and will yet have time for other domestic work. Each generation lasts about three months from its birth to its maturity, when it dies; so that in a summer two certain crops may be calculated on; and supposing that the two give but two arrobas (50 lbs.) of Cochineal, this will be more than 400 Rials for his labour. The chance of such a profit without any outlay should be a powerful motive to undertake it.

Senor Alzate has shewn by geometrical calculation that each Cochineal contains 632,777 young ones. This prodigious fecundity does not seem improbable, when we reflect that the greatest part of these delicate insects are destined to perish in the first days of their existence; several are preserved as mothers, and all the males disappear as soon as they have fulfilled their functions. With all this the annual crop of Cochineal in New Spain amounts to a large sum at the export valuation.

There are no insurmountable difficulties preventing Spain from enjoying this advantage. It would seem, on the contrary, evident that the mildness of the climate, the abundance and fine quality of the Nopals growing in all her southern provinces, and which will be improved by culture, and withal the few destructive enemies to the Cochineal—render the rearing of it both easy and certain, as we shall shew in the following pages. We anticipate that the Agricultural community will be convinced by them how easily they may obtain the advantages offered by this pursuit, increasing both their own comfort and fortune, and contributing at the same time to the public weal—the latter should be the chief object to which all the hopes of good Spaniards, lovers of their king and country, should be directed.

DIRECTIONS

For the Cultivation of the Nopal, and for Rearing the American Cochineal.

ARTICLE I.

1st. The Cochineal is an insect called by Linnæus *Coccus Cacti*, the body of which dried and powdered, gives a fine scarlet colour.

2nd. At its full growth, it is of the size of a small lentil. Though its proper colour is dark it is covered with a white dust, and it forms in its metamorphosis cocoons of a sort of stuff of the same colour.

3rd. As soon as born, the insect fixes itself strongly by the feet to the leaves of the Nopal, upon which it lives exclusively. It buries into the leaf or “raquette” a sharp trunk or needle which it has in the mouth, remaining thus attached until death; and if by accident it happens to become detached, it cannot recover itself, and dies.

4th. We shall now speak of the care and attention which the *plant which nourishes the insect* requires; and then of the care and attention to be bestowed on the insect.

ARTICLE II.

1st. The Fig of Tuna, so called in Andalusia, bears the name of Nopal in New Spain, where it is indigenous, and whence it has been taken to Europe.

2nd. It is employed in this country in the formation of living hedges, for which it is excellent; and its fruit is called "Figes Chumbos," or of Tuna. At Malaga the crop of fruit is considerable; and on the coast of Andalusia, the natives of the country eat it with relish, although it is somewhat astringent.

3rd. In New Spain, where the Cochineal has been cultivated from time immemorial, and where there are several varieties of Nopal, experience has pointed out those which are best adapted to nourish the insect. The Curate of *Cobulio*, Brother Antonio Lopez, of the order of Preachers, explains the most useful qualities, with their names, in a Treatise printed in 1818 at Guatemala. Upon the plantation and culture of this precious fruit, he speaks of the "Nopal Costeno" as two qualities of the Creole Nopal, and of two others, without names, of which he describes the forms and properties. It is not to be doubted that in the province of Oaxaca, where this cultivation is extensive and taken care of, there will be other varieties.

4th. In Spain there is only one species, differing very slightly, which may be attributed to local and accidental causes; and it is probable that this species is called in New Spain "Castilian Nopal," not from having been carried from this, but the Spaniards who find it in that country recognise it to be the same which flourishes with them, and give it the name of "Castillo," to express its identity.

5th. The greatest utility of these varieties of Nopal consists in having the leaves most tender and juicy—that it should have no spines—that it should be clothed with a certain feathery substance, which allows the insect to attach itself with greater facility.

6th. It follows from this, that the Nopal does not last more than three years, after which it becomes useless, and is dug up to make room for others.

7th. At the commencement, when there is only a small quantity of the insect, the best method is to choose some good leaves or "raquettes," of a year old, and implanting them in earthen pots to apply the insects, having another empty earthen pot to cover the leaves whenever the wind is high, or when it rains; you can then transplant them with more exposure to the sun, or wherever most suitable.

8th. To form an extensive plantation, it is necessary to have the leaves cut eight days before, to enable the cuttings to heal, if not, they rot. The soil is prepared by giving it a slight digging, and the plants are placed in rows at the distance of two "*vares*" from each other. It is of no consequence in what direction the leaves are planted, so that a distance of $\frac{3}{4}$ ths of a *vara* in a line be observed between the rows, to enable the weeds to be removed by the hand without injuring the tender branches.

9th. The soil has no need of being disturbed, or at least very little, and that may be done by the hand if it be thought necessary. During the hot weather, and the dry summer months, when it is likely to suffer, a little water may be applied to the roots of the plant every four days; in this case, irrigation should take place either early in the morning or in the evening.

10th. When the Nopals are a year old, and have given out new leaves, the insects can be applied to the plants for two successive years, after which they are rooted up, and others planted.

11th. It will be seen that the cultivator, in order to obtain a continuous crop of Cochineal, ought to arrange the ground so as always to have a useful reserve; that is to say, a plot of ground will be destined for the nourishment of young plants, and another plot will be occupied profitably by those already formed.

12th. In stony places, or on a declivity, it will be advisable to plant the leaves of the Nopals sideways, because they grow better, although the buds are found nearer the earth.

13th. The insects should be placed in such a manner as to be at a little distance from the earth, both for the benefit of the cultivation and the plant, thus guiding the vegetation upwards by cutting off all the lower buds and lateral leaves, and giving strength to the buds which shoot from the upper sides.

14th. The first plantation once established, it is unnecessary to take more care of it, for the remains of the Nopal which are grubbed up the third or fourth year supply what is essential for a new plantation.

15th. If the plants give flowers, which consist of a fleshy cylinder crowned with petals, which forms into a fruit, it is necessary to cut them off as soon as possible, because this germination hurts the plant, and weakening it by depriving it of its juice, the insect does not then find good nourishment.

16th. It is also very necessary to clear from time to time the leaves, in order to remove dust, cobwebs, or the marks they contract. - It is requisite to take great care not to touch the Cochineal in clearing. It is in this manner that care ought to be taken of the Nopal to obtain with success the desired benefit of a good harvest.

Let us now speak of the *care to be bestowed on the insect.*

ARTICLE III.

1st. When the Cochineal mothers arrive at their fullest size, they are about the bigness of a lentil*, which indicates that they are going to breed. It is when they throw out from the back part of their body a prolongation of white thread or hair that the generation is perpetuated.

2nd. A nest is then formed in the following manner :—Take a piece of cotton-gauze, or other tissue, which ought to be pierced with small holes to contain the mother, and admit of the young escaping. For example, a bit of tissue is cut four inches square, made in the shape of a purse, and eight or ten insects are put into it, which are carefully detached with a sprig from the leaves of the Nopal, where they are fixed.

3rd. The four corners of this gauze or cloth are drawn together, and attached by a thorn of the same plant to the middle of the leaf that has been chosen.

4th. The young escape and spread themselves over the surface of the leaf of the Nopal, and this operation of their birth lasts twelve, fifteen, or eighteen days.

5th. During this time the nest ought to remain where it has been placed, after which it is removed to bring off the insects that are there dead, and have performed the functions for which they were destined. A nest may also be made with the leaves which surround the cornet ; but to do this, a piece is taken which can contain ten or twelve Cochineal, forming a sort of cartouche, making it so that the opening be as large as possible ;—the mothers are placed at the bottom, and the open part of the “cornet” is applied to the Nopal by fixing it on with thorns in such a manner as to rest on the upper part for one day, by which the new insects can escape and wander over the leaf. Although the operation of nesting can be done at all times, experience

* A sort of pulse or pea.

has pointed out mid-day as the most proper to enable the insects newly born to get rid of the glutinous matter which they bring from their parent. On that account, nesting is not recommended in damp or cloudy days.

6th. In America, where it is collected on a large scale, there are two classes of Cochineal, the one which has given young called *zancantillo*, and the other which is nourished for the purpose before the time of breeding. This is much heavier, and on that account the cultivators sell much more of it, reserving only sufficient for propagation. The dye of the one or of the other class is equal—there are however some persons who prefer the *zancantillo*.

7th. To begin to introduce amongst us this precious branch of industry, it is essential above all to apply ourselves to augment as much as possible the number of insects. The cultivators ought mutually to communicate their labours and their methods, without destroying any of the insect until several generations are well spread or established.

8th. The operation of killing the Cochineal being that upon which depends its value in commerce; we shall speak of different methods employed in America, for this object.

9th. The first consists in exposing it to the sun during its greatest influence, in spreading it for four hours on cloth or any good substitute, and in stirring it about with the hand or a stick, by which means the heat penetrates the whole equally—this is repeated ten or twelve days consecutively.

In this manner the wild Cochineal or *Kermes*, which is collected in Andalusia is killed, and which is another species of insect of the family giving a scarlet colour, but possessing a different form, other properties, and very inferior in quality to the true Cochineal.

10th. The second mode of killing the insect is by dividing it into portions of ten or twelve pounds, in baskets made of plain leaves, and putting them into a furnace heated to such a degree that will admit of the hand being introduced without burning. These baskets are kept in the oven for eight or ten hours, after which they are exposed to the sun for six days.

11th. The third method is putting ten or twelve pounds into plain baskets upon which boiling water is poured, and the Cochineal stirred with a stick—the water is allowed to escape, and the insects remain dead. They are then left to dry in the sun for some time.

12th. The fourth way is to make a pit in the ground, in which a fire is made, well heated. The Cochineal is then applied, contained in an earthen vessel sufficiently baked as that it may stand to be covered by the cinders or the heated earth, if in the hole, and at the end of some hours the Cochineal remains dead.

13th. The last method consists in putting the Cochineal in baskets or long bags well closed, where the insect deprived of air is suffocated and dies.

14th. Each of these methods has its inconveniences, and requires such particular care that experience alone can demonstrate; and for this reason it behoves every cultivator to make trial on a small scale, and to choose that method which appears to him the most advantageous.

15th. We now return to the life of the insect. It passes four months from the moment of its birth, until the epoch of breeding. Thus three gatherings may be had in the year, but it is necessary to take care of it during winter, when to preserve, is of more consequence than to multiply it; we should not reckon upon more than two crops between March and October.

16th. In America, the Cochineal has in common with other insects several mortal enemies which destroy it, but that which has been reared at Cadiz has encountered none in particular. It has been found necessary to guard it from the snails, which ascending by the leaves of the Nopal throw down the Cochineal, and cause its death. The ants do not attack it. Some small spiders which spin their web between the plants catch the male insect, and hinder fecundity, and on this account it is desirable to clean the plants.

17th. It is necessary to know that the Cochineal, as is the case with insects of the class to which it belongs, undergoes transformation;—and to the distinguishing of sexes, at the thirtieth day from its birth they become fixed to the leaf and begin to form small cylinders of white flock, a few days after that very small flies come out of these cocoons—these are the males who jump about over the leaves and die after fulfilling the laws of fecundity.

18th. When the cultivator intends to propagate the Cochineal, he ought to take care of the cylinders and of the small flies, in order that they may fecundate the female; and that they may not be disturbed, he ought to delay the operations of cleaning the Nopal until the seventeenth day of the birth of the insect.

19th. At the end of this period, when the males have fulfilled their functions, or if it is proposed to kill the Cochineal without waiting its propagation, it will be well to clean softly the insects during the last period of their existence with a fox or hare's tail, taking great care not to make them fall from their leaves, because they die on being detached. You can also in blowing moderately with the mouth, carry off the white dust which they form, as well as the little cobwebs, and the little empty cocoons of the males.

20th. When the nests are placed, it is necessary that the young in going out should proceed upwards; and with this view, the nests are placed in the lower part of the most tender and the strongest leaves. If they appear too thick or numerous to prosper, the nest is placed with precaution on another leaf.

21st. It is absolutely necessary in rearing Cochineal to guard it against rain which causes it to fall, and engenders disease.

22nd. At the commencement, persons who would wish to apply themselves to this branch of industry, at once curious and useful, may plant some stems of Nopal under a shed or corner which shelters it from the rain, or to place in a flower-pot a double leaf of Nopal to establish the nest, which may be placed in the sun or shade at pleasure.

23rd. To cultivate extensively, as in America, a gallery of defence ought to be formed above the lines of Nopal, with reeds or other materials which admit of a circulation of air, and strong enough to resist the wind and rain. The winter generation can also be preserved without further precaution; it will nevertheless be better to keep them under cover during the rains.

24th. The most suitable manner of rearing the Cochineal in this country, will be to place the leaves of the Nopal at the distance of $1\frac{1}{2}$ *vares*, near to garden hedges or vines, to form above each plant a small covering or shelter against the rain, to maintain the Cochineal, and to renew these plants after the fourth or fifth year. By this means one adds a new product to his estate, with no more expense than a little trouble.

25th. To guide the attention of the cultivator, he ought to make the following calculation, which is as near as possible to a pound weight of Cochineal, or about 25,000 insects dead and dry. If he plant five lines of five Nopals, which shall have each ten good healthy leaves, such as they ordinarily are at the end of three years, and place

a nest of ten mothers upon each leaf, which can each nourish 100 insects, he will have the 25,000 insects, which make one pound. In regard to the dimensions of the plots, he must remember that the lines ought to be equi-distant two *vares*, and the plants three quarters of a *vara* which will give a square of eight *vares* long by three and three quarters, which will give 38 *vares* square—enough for the production of a pound of Cochineal.

The area might be reduced to six *vares* in length to reap the same quantity.

26th. These instructions will suffice to enable any intelligent cultivator to apply himself to this culture, to extend it, and to make it one day a branch of commerce interesting to the nation at large.

NOTE.

Don Ildefonsa Ruez del Res, Member of the Royal Economical Society of Cadiz, presented in 1820 a case containing some leaves of the Nopal, with the living insect, which was sent to him from Vera Cruz by Don Pedro Josef Cuoago. This voluntary gift of our worthy colleague, was intended to engage the Society to cultivate the article, his occupations not permitting him to do it himself. The Society having accepted with gratitude this present, committed it to the care of a gardener, whom it entertained at its own expense for a period of two years, under the inspection of a Committee composed of members of their own body to observe upon the life of the insect, to preserve and to propagate it by all possible means, and to report the result of their observations to the Society. In order that this Society might be enabled to hold out hope based on success, it resolved that experienced persons should make the most scrupulous inquiries, decisive of what species and of what quality this Cochineal was cultivated and reared at Cadiz.

It followed from the declaration of the most able and scientific men, that this Cochineal was of the same quality as that in commerce denominated *zancantillo*, and not yielding to the best which comes from New Spain. Not satisfied, the Society upon their first Report had two pieces of woollen stuff of equal quality dyed by a confidential person, the one with the Cochineal of Cadiz, and the other with the best brought from Oaxaca. The two pieces brought out a dye equally beautiful, nor could the slightest difference be recognised as to "intensity and brilliancy of colour."

The Society relying upon this series of experiment, dictated by prudence, and indispensable in a matter so interesting, presented to the King, our lord, a plain statement of the History of this Insect, from its arrival on the Peninsula, and the probability of acclimating it in several of our provinces, without altering or diminishing the qualities of the Cochineal, contrasted with the American. His Majesty, ever disposed to promote enterprise which tends to the public welfare and to the happiness of his subjects, condescended to approve of the suggestions of the Society of Cadiz, in according to it all the assistance which it solicited to carry the culture and acclimation of the Cochineal to the degree of prosperity at which it has arrived. All these facts are recorded in the Proceedings of the Society, and are confirmed by the original Papers which exist in the office. It is proved by these documents, that the Cochineal is the exclusive property of the Royal Economical Society of Cadiz—property which no one can dispute; and if, as it is hoped, this culture extends in proportion to what it is susceptible—if it adds some day to Spanish Agriculture and Commerce the incalculable advantages which the Americans have drawn from it—all will be due to the zeal with which this body endeavours to fulfil the intentions of its beneficial establishment.

What is certain is, that the Cochineal, or *Grana Fina*, before now was never propagated in Spain or in any other part of Europe. This insect is totally different, both as respects its generic characteristic, and its mode of living and procreation from the species called *Kermes*, or *Granilla*, which is produced spontaneously on the leaves of the *Carras-sia**. The only resemblance which it bears, is that this last gives also a red colour, but very inferior to the other. The Chapter of the Cathedral of Cadiz has also been desirous of collecting the tenth part of the *Kermes*, or *Granilla*, of which there is abundance in the village of Chularme, and it is probable that it abounds equally in other parts of Andalusia, since it was known in the time of the Moors, in the kingdom of Jain. In the description of *Spain* by the Chief Aledris, translated from the Arabic by Don Josef Antonio Coude. at pages 90 and 91 it is related, "In the eastern part of Jain before Biescu, there is a large fort called Kuedhar, and takes its name from the *Chalut Xuedhari*."

* The Yew-tree, a small oak. or misgrown tree.

The Translator, in his Notes, page 226, explains the text in the following manner:—" *Xuedhari Jodar el Chatut* is the juice of the grain *Kermes*, which is used for dyeing a fine red colour, as we call it at present." The term "I'scarlat," or "Escarlata," is also Arabic. Senor Resos could convince himself of the truth of this observation by comparing the *Kermes* which is produced spontaneously, and sometimes in great abundance upon the branches of the *Carrasia*, in the district of Chiclana, with the Cochineal which is actually cultivated with great care at Malaga, and which lives on the Nopal only.

The Bourbon Insect pronounced to be the "Grana Fina" by Monsr. PEROTTET, Agl. Botanist to the French Govt.

Translated Extract from a letter of Monsr. PEROTTET, to Dr. WALLICH, dated Kaitie, Neilgherries, March 16, 1838.

[Read 11th April, 1838.]

I have received here, where I have been for two months, the letter which you have done me the honour to write, dated the 20th February last, as also the two pamphlets which accompanied it. I beg you will be so kind as to convey to Mr. Bell and Mr. Bruce the expression of my sincere thanks for these two interesting tracts, which I will read with so much the more interest, since I was myself engaged not long ago upon one of the branches of industry of which they treat.

I am exceedingly sorry that I cannot meet the request you have made, relative to the fine Cochineal, and to the plants on which it lives.

Mr. Delissert could inform you, that both these had been sent to Pondicherry since he went to Bourbon, whence my excellent friend, M. Richard despatched to me a case in good order; but to say that we now possess them in a living state is not correct. I was on the Neilgherries when these precious objects arrived at Pondicherry, and the Indian gardeners attached to the Botanic Garden, to whom they were confided, allowed the plants, as well as the insects that were placed upon them to perish, so that now we have none. I can assure you, however, that this insect, and the plant upon which it was established, are the same as those that you have received, because they proceed from the same source. I can assure you, moreover, that it was in reality the fine Cochineal called "*Mestique*" or "*Grana Fina*,"

and the true Nopal of the Castilians, or of the inhabitants of Mexico, quoted by Thierry de Menonville. I assured myself of this in July, 1834, the date at which I touched at Bourbon on my way to India; indeed, I saw in the Botanical Garden of that colony, several stems of this Nopal covered with fine Cochineal, which were in the height of perfection. The Cochineal was very large, and perfectly naked; it shewed all the rings which characterize it. Monsieur Richard put up for me some joints of Nopal, strewed with Cochineal, which I preserved at Pondicherry until the third generation, which ended by dying for want of sufficient nourishment, the Nopals not having taken root.

During my stay on the western coast of Africa I received from Madeira several stems (rooted) of the *Opuntia Cochinelifera*, (Mill.) charged with fine Cochineal, or *Grana Fina*, which I preserved for a long time, but I lost also the insect, from a scarcity of plants. Nevertheless, I had an opportunity of making several experiments, and of attending with the most exact care the reproduction and development of this precious Insect. I endeavoured, at several stages, to fix it upon other species of *Opuntia*, such as the *Op. Ficus Indica*, the *Op. pseudo Tunu* and the *Op. Hernandezii*, but I never could succeed; the insect always perished without fixing itself permanently. I observe then, that the best species was certainly the *Opuntia Cochinelifera* of Miller, and that it is absolutely necessary to adopt that species in rearing the fine Cochineal.

What I found very remarkable was, that the *Sylvestre* Cochineal, of which we had great abundance, would never attach itself to the *Opuntia Cochinelifera*, notwithstanding all the care I took to succeed. I had commenced a work upon the two species of the Cochineal which were the objects of my care at Senegal, but I was obliged to suspend it, owing to circumstances over which I had no control, so that I can communicate little or nothing; and I regret the more, seeing that this branch of industry is engaging much attention on your side of India, and that I should have been most happy to have been of service to you in the matter.

SECRETARY'S REPORT,

(No. 2.)

Upon the Cochineal Insects committed to his care by the "Agricultural Society of India," in conformity with a recommendation of the Committee, confirmed by a General Meeting of the Society on the 14th February, 1838.

[Submitted at a General Meeting, 8th August, 1838.]

The Bourbon Insect.—In my last Report, (No. 1.) dated March 13th, and read at a General Meeting of the Agricultural Society on the 14th idem, I informed the Committee that of the few Bourbon insects, sent by Monsieur Richard, I had made the most, by encouraging the young progeny to attach themselves to the varieties of Cacti therein described, Nos. 1 to 6—and that at the time of drawing up my Report, they had adhered to the Cactus *Tuna*, *Indicus*, *Pereskia*, and *Cochinellifer*; expressing a doubt on which, if any, of these species the Cochineal insect would come to maturity.

I watched with intense anxiety the result of this experiment, and had such high hope that the insect would thrive on the *Tuna*, that I collected from the jungle as many large plants as I could. I soon found, however, that my labour had been thrown away; the insect gradually sickened, and died before the first change in its existence had been effected; and at the end of ten days the leaves of the *Tuna*, which had been covered with the young insect, did not exhibit *one* alive.

The same result was obtained from the *Indicus*, with this exception—the insects lingered until the seventeenth day, when nothing was to be distinguished but the delicate filaments which the *Grana Fina* throws out, when it first adheres to the leaf.

On the Cactus *Pereskia* the insect's existence was prolonged two or three days beyond the term of its life on the Cactus *Indicus*; but it declined in the same manner, without any healthy indication, after the eighth day.

On the Cactus *Cochinellifer* I was more successful. Nine insects arrived at maturity, and I was sanguine that I should secure from them a second generation, but in this I was disappointed; a succession of strong "North Westers," notwithstanding all the care I observed to protect the plants by hoogla mats, carried off the only three male insects, before the females were impregnated; and I thus lost the only hope I had entertained of keeping up the race.

From these data, I arrive at the facts—

1st. That the Cactus *Tuna*, a fine fleshy-lobed plant, and more tender in the outer skin than any of the other, has something in its juice poisonous to the Cochineal insect.

2nd. That the *Indicus*, although greedily devoured, in preference to all other kinds of Cacti, by the *Sylvestre*, is incapable of sustaining the *Grana Fina*.

3rd. That the same remarks apply to the *Pereskia*.

4th. That the Cactus *Cochinellifer* is the only plant at present in India upon which the *Grana Fina* will attain maturity.

5th. That the Cactus *Cochinellifer*, although a tolerable substitute, is not equal to the Bourbon Cactus*, which is much thicker, and more fleshy than the former, and presents a clear mucilaginous juice when cut, which the Cactus *Cochinellifer* does not possess.

The Cape Insect.—I come now to the *Cape* insects brought to India by Captian Charlton, and which, by my last Report, had attached themselves to the Cactus *Indicus*, *Cochinellifer*, *Tuna*, *Hexagonus* and *Pereskia*.

Precisely the same results were obtained as with the *Grana Fina*, on some of the plants. They existed from 10 to 15 days on the *Tuna*, *Hexagonus* and *Pereskia*, but it was a mere state of insipid life; no enlargement took place after the eighth day, when they appeared to shrink back until they wholly disappeared, leaving only a slight deposit; while on the *Cochinellifer* and *Indicus* they have rapidly multiplied, and may be multiplied to any extent; but with every tendency to increase numerically, they do not attain the same size on the *Cochinellifer* as the *wild* insect common in this country arrives at on the Cactus *Indicus*.

I here desire to correct an error which I was led into, when prosecuting experiments with the *wild* insect ten years ago, and which I repeated in my preface to the Pamphlet lately published. I then stated, that the *Sylvestre* would not feed upon the Cactus *Cochinellifer* of the Honorable Company's Botanic Garden, and I arrived at that conviction from having given the insect a trial upon that plant, placed in contact with the Cactus *Indicus*—it refused the former, and adhered to the latter.

* Castilian Nopal.

Recent trial with the *Cape* insect has elicited the fact, that it *will feed* upon the Cactus *Cochinellifer*, although it *prefers* the Cactus *Indicus*; and will not take the former, if the leaves of the *Indicus* are brought to touch those of the other before the insect has settled. Neither, (as far as I have yet ascertained,) does the insect attain so great a size upon the Cactus *Cochinellifer* as upon the common *Indicus*; but further experience will determine this point. This much however is certain, that the Cactus *Cochinellifer* is less sensitive, and does not perish under the insect's bite if left uncleaned during the second generation, as does the *Indicus*; but it is necessary to add, that these experiments have been made upon *young plants*, and the difficulty to cleanse the *Indicus* must give the *Cochinellifer* a decided preference if it is found capable of nourishing the real insect, so that it may be brought to an equal size as on the Castilian Nopal.

The Insect already in India.—The result of my experiment with this insect, proves that the Cactus *Tuna* is wholly unfit for the Cochineal.

As stated in my last Report, I inoculated all the plants in the Plot therein described, marked C, consisting of the Cactus *Tuna*, *Indicus*, and *Cochinellifer*.

The *Tuna* being by far the largest plants, had some hundreds of large insects hanging upon them in cartouches, and the young from them were seen in thousands traversing every lobe. At the end of a week, every young articulation was literally covered with clusters of the scarlet insect, and on many of the thick lobes they had formed similar densely studded colonies, while the male flies were travelling about, fulfilling their functions.

During the second week they continued to live, and I thought that in the possession of the noble blue-leaved *Tuna** we had all that was desired to render the propagation of the *wild* insect an object of commercial importance.

My hopes were of short duration. After the 15th day no males were perceptible, and the clusters of females, from a bright lively scarlet, began to assume a dark brown hue, and quickly dried into a very thin scale, only to be discerned by the aid of a magnifying glass. So rapid indeed was the blight, that I should have attributed it to the intense heat, but for the obstinate fact, that on each of the intervening

* Dr. Wallich designates this the "*Tuna Major*."

Indicus plants the insects blanched them like driven snow, and have continued to multiply beyond the strength of the leaves ever since.

I ought not to omit noticing the great dissimilarity in the appearance of the young insects on these two species of Cacti. On the *Tuna*, after clustering and imbedding their trunks into the leaf, they continued to exhibit a perfect naked scarlet body, without the least filament; while on the *Indicus* they immediately threw out the cottony web, which increased in tenacity with their size. I am at a loss to account for this phenomenon, and leave its solution to those who may be better able to explain it.

In addition to the plants in plot C, I inoculated ~~200~~ plants of *Tuna*, which I had in another part of the garden, with the *wild* insect. One solitary plant of *Indicus* had been put in unintentionally by the mallee: the same result was obtained—not an insect on the *Tuna* increased beyond the size of a wood louse—the clusters then became discoloured, and shortly disappeared, while the *Indicus* plant became perfectly white with the cottony covering of the devouring insect.

I ought to explain, that the insect *perished* upon the *Tuna*; and for the information of those who have not paid attention to the habits of the Cochineal, I should state, that the female insect from the time it first attaches itself to the leaf remains immovable until death, and if driven by force from its situation is incapable of re-attachment.

Having given the details of my experiments at some length, I am anxious to obtain the sanction of the Committee to root out the plant which has proved so unworthy of care as nourishment for the Cochineal—the *Tuna*, as it is choking up the *Cochinellifer*, which I wish to preserve as food for any more insects the Society may receive from Bourbon, in the event of a sufficient supply of the Castilian Nopal (which has been written for by Dr. Wallich and myself) not coming to hand until the few lobes I have can be propagated to some extent; although I am sorry to say that owing to the lobes having been partially decayed, I have been only able to preserve two of the original plants upon which the *Grana Fina* arrived from Monsieur Richard, but these with care may be multiplied.

Since writing thus far, I have received* from Dr. Wallich a box containing a single leaf of the real Bourbon plant with six small insects of the real *Grana Fina*, brought up from that island on the

* July 4th, 1838.

ship "Cavendish Bentinck," and presented to the Society by Major Archer. Dr. Wallich states, that owing to the severe illness of Major Archer on board, the box was neglected, and nearly the whole of the new emigrants were destroyed by cockroaches. Captain Mackenzie, who commanded the vessel, informs me that there were *some hundred* insects originally, on several lobes; but that during the voyage the leaves decayed towards the roots, and on their arrival at Calcutta only one leaf remained, containing, as I have stated, six small and sickly insects.

This misfortune is to be regretted, since with the result of experiments before me, I am prepared to hazard an opinion that the *Grana Fina* may be cultivated to perfection in this country, by observing the precautions taken in Oaxaca to preserve it from rain and damp, and provided we can obtain the real Cactus from Bourbon, which is essentially different from the Cactus *Cochinellifer*. But I much fear that I shall be unable to make any thing of Major Archer's present, unless indeed the females may have been impregnated on board ship, for there are no males on the leaf.

I am perfectly confident that a little perseverance will put India in possession of this most valuable dye, and that through the medium of the Society, we may be enabled to establish it in such parts of the country as may present a dry atmosphere.

July 6th, 1838.

Addendum.

Since writing the above, I have to report the death of the only insects remaining of Major Archer's importation. I examined the leaf, in the presence of Major Archer, on the 3rd instant (August) and found the insects to be dead.

I have however the gratification to observe, that a new supply has arrived from Bourbon on board the French ship "Therence," Capt. Caillol, consisting of a glazed case containing a dozen plants of Cactus, which, upon the whole, are healthy; but only seven of the Cacti have insects, and these, I regret to say, are very scantily supplied, as most of the plants had decayed at the roots, and the finest of the insects had perished; being on one plant in particular a mass of white mould. I have thought it expedient to take them out of the case and plant them in my Nopalerie, excepting four plants which I

have kept in pots, awaiting the Society's orders whether they are to be entrusted to my care or otherwise.

JOHN BELL.

August 4th, 1838.

Circular.

To F. P. STRONG, W. STORM, C. HUFFNAGLE, H. H. GOODEVE,
GEO. EVANS, D. W. H. SPEED, H. H. SPRY, *Esquires,*
Members of the Cochineal Committee.

GENTLEMEN,

I have the honour to submit for your consideration and approval, draft of a Report of the experiments I have made with the Cochineal insects up to this time, and should have invited you to visit and inspect the "Nopalerie" long ere this, but thought it would be useless trouble to you, seeing the objects of our solicitude were dead.

I particularly wish your sanction to root up the Cactus *Tuna*, and to plant more of the Cactus *Cochinellifer*, until I procure the real Bourbon Cactus.

I have the honour to be, Gentlemen,
Your humble servant,

Calcutta, July 6, 1838.

J. BELL.

P. S. I beg to circulate also the second Pamphlet as far as printed.

Minutes.

"We are abundantly indebted to Mr. Bell for the great care and attention he has shewn to the subject; and I certainly think the Cactus alluded to by Mr. Bell should be rooted out, and every opportunity adopted to encourage the plant he has formed a good opinion upon. With such attention to the subject as Mr. Bell has shewn, if he has only further opportunity of prosecuting the inquiry, I really think our Secretary will be the means of gaining this article as an important staple to the commerce of India."

F. P. STRONG.

"I agree most fully in the above opinion of Dr. Strong."

D. W. H. SPEED.

"We are much indebted to Mr. Bell for the valuable information communicated in his second Report, and think the offending plants

might have been rooted out without waiting for the sanction of the Committee.

“The misfortune attending Major Archer’s importation may be of some use in suggesting some mode of preserving the Cactus, and of placing it out of reach of cockroaches.”

W. STORM.

“I agree with Dr. Strong; and certainly think Mr. Bell, to whose exertions we are greatly indebted, will eventually succeed in establishing a colony of *Cochineal* insects; we have every encouragement to persevere.”

H. H. GOODEVE.
C. HUFFNAGLE.

“I do not conceive Mr. Bell’s data sufficient to establish the integrity of the conclusions to the extent that he appears to concede to them. The insects had only been landed from the ship a few days, and they might have been, and probably were, sickly.

“The Report is a clear and interesting one, although the result has proved so unfortunate.”

H. H. SPRY, M. D.

TO HIS EXCELLENCY MONSIEUR BEDIER,

Sec. Sec. Sec.

Bourbon.

SIR,

I am commanded by the Agricultural Society of India to offer you its special thanks for the kind attention which you have paid to its interests, by influencing your Government to send, through Monsieur Richard, a supply of *Cochineal* and *Sugar Cane* which has reached Calcutta in the best condition.

2. I have been directed by the Society to solicit a continuance of your kindness, in asking for an additional small supply of the *Cochineal*, with such information, in reference to its introduction at Bourbon, as you may be pleased to grant.

3. Your Excellency will perceive, by a Pamphlet which I have the honour to enclose, that a doubt has been cast upon the *Insect* sent from Bourbon being the *genuine Grana Fina* of commerce.

It would be most satisfactory if such doubt could be removed, and the Society is sanguine that this doubt has only to be brought to your notice to be at once set at rest.

4. If to this additional tax upon your kindness, I could ask for a supply of the *Cactus* upon which the Insect is reared at Bourbon, I need not say how much it would be appreciated.

I have the honour to be,
&c. &c. &c.

JOHN BELL,
Secretary.

Agricultural Society's Office,
Calcutta, 16th February, 1838.

TO MONSIEUR RICHARD,
Superintendent of the Botanic Garden,
St. Denis, Bourbon.

SIR,

Your letter to the address of Dr. Wallich, advising the despatch of two cases containing the Cactus plant and living Cochineal Insects, was read at a General Meeting of the Agricultural and Horticultural Society of India on the 14th instant. Your favour to the same gentleman, intimating your intention to forward 18 cases of Batavian Sugar Cane, for the use of this Society, was likewise read.

2. The excellent condition in which both the Cochineal and Canes arrived has no doubt been communicated to you by my much respected friend, Dr. Wallich, so I shall not dwell on this point.

3. I am directed by the Agricultural Society to offer you its best thanks for the courteous and prompt manner in which you attended to its solicitations, conveyed by Dr. Wallich : and to assure you of the deep obligation under which you have placed the Society, for your praise-worthy exertions in its behalf. You will greatly add to these obligations by favouring the Society with a small supply of the *Cactus* on which the Cochineal Insect has arrived. Dr. Wallich has given me a liberal supply of the *Cactus Cochinelifer*, but there appears to be some doubt as to its being identical with the species of *Cactus* received from you ; and we may not be able to keep the Insect alive, should it turn out to be really a different variety. Dr. Wallich has doubtless informed you of the difference of opinion that exists here, as to the fact of the Insect, sent by the Bourbon Government, being the real *Grana*

Fina. No doubt exists in my mind, as you will perceive on perusing a Pamphlet which Dr. Wallich has kindly promised to forward; but it would be very satisfactory, and you would confer a lasting favour on the Society, if you would kindly inform us, whence you procured the Insect, and what you denominate the Cactus on which it feeds at Bourbon; and whether it is the same Cactus as is cultivated in Mexico for the purpose of maintaining the *Grana Fina*.

If the Society be not indenting too freely on the liberality of the French Government, might I crave on its behalf, a very small further supply of the Insect? My reason for asking this is, that I much fear unless we possess the same Cactus as you do, we shall not be able to prosecute our experiments to ascertain whether the climate of Bengal is favourable to the introduction of this article.

Begging that you will excuse all the trouble the Society has imposed on you,

I have the honour to be,

&c. &c. &c.

JOHN BELL,

Secretary.

Agricultural Society's Office,
Calcutta, 16th February, 1838.

The Bourbon Insect pronounced to be the "Grana Fina" by
Major Archer.

Extract of a Note from Dr. Wallich to Mr. Bell, dated July
4th, 1838.

[Read 11th July, 1838.]

"Major Archer has this instant called here and left this little box, containing some Cochineal and Opuntia, which I hasten to send you. He says it is the true real Cochineal (*Fina*), and expresses himself delightfully on the occasion of the question that has been put to the contrary.

"During Major Archer's illness the cockroaches have destroyed almost all the worms."

N. B — For the result of this presentation, see Note at the end of Secretary's Report, No. 2.

*The Bourbon Insect pronounced to be the "Grana Fina" by
Monsieur Richard.*

*Extract of a Letter from Monsr. Richard to Dr. Wallich, dated
St. Denis, Bourbon, 20th June, 1838, received per "Therence"
the 1st August.*

[Read 8th August, 1838.]

"C'est d'après la demande dans votre dernière lettre et dans celle de Monsr. Bell, Secrétaire de la Société d'Agriculture et d'Horticulture de L'Inde que la caisse de Nopals et d'~~Insectes~~ Cochenilles a été préparée pour vous être envoyée. Je desiré sincérement qu'elle arrive en bon état à Calcutta, elle est recommandée au Capitaine par Mons. Bedier.

"Relativement a l'espece de Cochenille que vous avez reçu de Bourbon, je n'ai que le temps de vous en dire quelques mots. Mons. Bedier, Commissaire Ordonnateur de Marine a bien voulu s'occuper de cet object et doit écrire à cet sujet a Mons. le Secrétaire de votre honorable Société. Je prendrai seulement la liberté de vous dire ici que l'espece de Cochenille dont il s'agit, a été introduite a Bourbon en 1826, sous le nom de *Grana Fina*, ou Cochenille fine, quelle a été apparti par un bâtiment de l'Etat, qui l'avait prise a Cadiz, en Espagne, sans doute d'apres une demande du Gouvernement François, que quelques années avant cette époque elle avait été apporté à Cadiz, avec l'espece de Nopal qui la nourrit ordinairement et que c'est sur cette même espece de Nopal qu'elle vous a été envoyée à Calcutta. Voilà les renseignements que j'ai pu me procurer; je n'étais pas à Bourbon lors de son introduction dans cette colonie.

"Depuis son arrivée a Bourbon cette espece a toujours été regardée, dans ce pays, comme la vrai Cochenille fine; c'est, aussi je vous l'avoue franchement mon opinion. J'ai été amené pendent plusieurs années de voir la Cochenille dite Sylvestre; la différence très marquée qui existe entre les deux especes ne me laisse point de doute sur son identité avec la *Grana Fina*. Je n'entrerai pas ici dans d'autres details.

J'ai reçu la lettre que Mons. Bell, Secrétaire de l'honorable Société d'Agriculture de l'Inde a bien voulu m'honorer. Je regrette de ne pas pouvoir par cette occasion lui en temoigner mes sincères remerciements."

(*True Extract,*) N. WALLICH.

The Bourbon Insect pronounced to be the "Grana Fina" by Monsieur Bedier, on the authority of the Count de Cheffutaine, who carried it from Cadiz to Bourbon, also on that of Thierry de Menonville, Mons. Richard, Mons. Perotet, and on his own personal observations.

A MONSIEUR BELL,

Sécretaire de la Société d'Agriculture de Calcutta.

[Read 8th August, 1838.]

MON CHER MONSIEUR,

J'ai reçu tardivement les deux lettres, que vous m'avez fait l'honneur de m'écrire sous la date du 16 Février dernier, ainsi que la notice y annexée relative à la Cochenille. .

J'ai été très sensible à l'expression de vos sentimens personnels et aux remerciemens que vous m'avez adressée au nom de la Société d'Agriculture de Calcutta. J'aurais désiré que ce nouveau témoignage de sa bienveillance reposât sur des titres plus dignes de son estime. J'ai eu malheureusement peu d'occasions de lui montrer toute la sympathie que j'éprouve pour une institution aussi généreuse et aussi philanthropique, et pour les hommes honorables qui s'y dévouent. Je vous prie de lui donner l'assurance qu'elle me trouvera toujours empressé à seconder ses vues, en tout ce qui pourra dépendre de moi.

Le nouveau Gouverneur de Bourbon, M. de Hee, homme d'une vaste instruction et de sentimens élevés, s'est associé au desir que M. Richard et moi, nous avions de répondre à vos demandes ; et les ordres sont donnés pour qu'un nouvelle envoi de Cochenille et de plants de Nopal vous soit fait. M. Caillat, Capitaine du navire la "Therence" qui se rend à Calcutta, m'a promis de prendre le plus grand soin de ces objets pendant sa navigation, et de vous les remettre aussitôt son arrivée. D'un autre côté M. Richard ne negligera aucune précaution pour assurer leur conservation, de sorte que j'ai l'espoir qu'ils vous parviendront dans un état satisfaisant.

J'ai lu avec un vif intérêt la notice relative à la Cochenille : elle prouve avec quel soin consciencieux et avec quelle sollicitude la Société d'Agriculture de Calcutta s'occupe des questions quelle a traiter.

Les auteurs des articles qui composait cette notice, ont fait preuve d'une connaissance théorique approfondue de la matière en discussion ; cependant ils n'ont pas été d'accord dans l'appréciation de la Coche-

nille envoyée de Bourbon : Les uns ont pensé qu'elle est de l'espèce *Grana Fina*, les autres de celle *Grana Silvestra*, vous me dites à ce sujet : [“ It would be most satisfactory if such doubt could be removed, and the Society is sanguine that this doubt has only to be brought to your notice to be at once set at rest.”]

J'éprouve le regret de ne pouvoir répondre par des connaissances spéciales et une expérience personnelle, à cette preuve de confiance de la Société ; mais je n'ai rien négligé pour me procurer sur le lieu, tous les renseignemens propres à éclairer la question.

J'ai d'abord cherché à connaître l'origine et la provenance de la Cochenille qui existe au Jardin Botanique, de Bourbon. J'ai consulté à cet effet les archives de l'administration et j'ai trouvé que cette Cochenille, ainsi que le Nopal sur lequel elle est élevée, ont été introduits dans la colonie au mois d'Octobre 1826, par un bâtiment du Roi, (*L'Elephant*) qui avait touché à Cadix et au Brésil ; et dans un discours prononcé par M. Le Comte de Cheffautaine qui venoit à cette époque prendre le Gouvernement de Bourbon, on lit :

“ L'introduction à Bourbon de la Cochenille peut avoir le double avantage de procurer à la colonie une production pour laquelle la France paye encore un tribut à l'étranger, et d'offrir un moyen de faire naître chez les petits créoles le goût du travail en mettant à leur portée une culture qui exige peu, et qui est susceptible de rapporter beaucoup, c'est dans ces vues que le Commandant de Ereycinet a demandé que des plants de Nopal pourvus de Cochenille fussent envoyés à Bourbon. Des recherches ont été faites pour avoir le vrai Nopal et la Cochenille *fine*. J'ai été chargé d'apporter ces objets précieux, &c. &c.”

On ne dit point où ces objets avoient été pris, mais il en bien évident que leur introduction à Bourbon a eu lieu d'après les ordres et par les soins du Gouvernement de la Métropole qui avoit pris toutes les mesures convenables pour procurer à la colonie la Cochenille fine (*grana fina*) et le véritable Cactier qui la nourrit (*cactus opuntia cochinelifer*).

Maintenant si l'on examine l'insecte qui existe au Jardin Botanique de Bourbon, dans son état naturel & ordinaire, lorsqu'il n'a éprouvé aucune alteration par le déplacement, le changement de température et d'habitudes, on reconnoît qu'il répond parfaitement à la description que Thierry de Mononville a donnée de la Cochenille fine (*grana fina*) qu'il a observée à Guaxaca.

“ Lorsque les Cochenilles femelles ont atteint leur développement, elles paraissent de la grosseur d'un petit pois de France, un peu alougées, le corps aplati du côté du ventre et de l'abdomen, le dot convexe, rayé par des rides transverses aller qui aboutissent au ventre par une double marge sur laquelle on voit douze petites soies dans les jeunes, qui disparaissent dans les adultes, auxquelles il n'en reste que quelques unes à l'extrémité de l'abdomen. Elles semblent blanches au premier coup d'œil, mais dépouillées de la poudre blanche qui les couvre, elles sont d'un brun très foncé ; elles ont six petites pattes presque imperceptibles.”

“ La grande différence extérieure entre la Cochenille Sylvestre et la Cochenille fine, malgré la poudre dont il est recouvert, s'aperçoit parfaitement bien, au lieu que l'on voit à peine la Sylvestre qui est enveloppée de coton. La Cochenille Sylvestre qui est donc cotonneuse, et la Cochenille fine farineuse ou poudreuse, mais toujours du double plus grosse que la Sylvestre.”

J'ai examiné minutieusement et pendant de longues années, à la simple vue et à l'aide d'une Loupe, la Cochenille que nous possédons, et j'ai acquis la conviction quelle est identique avec celle d'écrite par Thiery de Menonville. Couverte d'abord légèrement d'une poudre blanche, la partie supérieure de son corps se nettoie graduellement et se montre à nu vers l'époque de la fécondation ; c'est à dire dans le second mois de son existence. Je n'ai aperçu sur aucune femelle cette robe cotonneuse ou soyeuse qui caractérise la Cochenille Sylvestre ; seulement à l'époque où les mâles se dépouillent de leurs enveloppes ou fourreaux, on remarque sur les Nopals une substance blanche pâteuse qui simule à la première vue du coton, mouillé & tordu.

M. Richard qui a eu la surveillance d'une Nopalerie de Cochenilles Sylvestres au Sénégal ne conserve aucun doute sur la qualité de celles que nous possédons. “ J'avais, me disait-il la plus grande peine à dépouiller la Cochenille Sylvestre de son enveloppe cotonneuse qui est adhérente au corps de l'insecte tandis qu'il suffit de souffler sur la Cochenille que nous avons pour la nettoyer complètement de toute la poudre qui la recouvre.”

M. Perrottet, naturaliste du Gouvernement qui est maintenant à Pondichery et qui a passé à Bourbon, a reconnu que la Cochenille qui existe ici est la véritable grana fina. M. Perrottet, m'assure-t-on s'était occupé spécialement de cet insecte et avait été chargé d'une mission par le gouvernement, pour s'en procurer à Cadix.

L'Introduction de la Cochenille à Bourbon, n'a pas eu les résultats qu'on en espérait; le prix du travail y en trop élevé pour que cette industrie puisse y être productive; ensuite la régularité et la minutie des soins qu'elle exige, n'entrent pas dans les habitudes et l'esprit des petits créoles aux quels on la destinait.

Tels sont, Mon cher Monsieur, les renseignements que j'ai pu me procurer pour répondre à la question que vous m'avez adressée au nom de la Société d'Agriculture. Je pense qu'avant de les recevoir, vous aurez, par l'étude et l'examen des Cochenilles qui vous ont été envoyées, reconnu qu'on ne peut conserver aucun doute sur leur qualité et qu'elles appartiennent bien à l'espèce *Grana Fina*.

Veillez me rappeler au souvenir de notre très honorable Président Sir Ed. Ryan, et croire aux sentimens de haute considération et de dévouement avec les quels je suis.

Mon cher Monsieur,

Votre très obéissant Serviteur,

St. Denis, Isle Bourbon,
ce 16 Juin, 1838.

A. M. BÉDIER.

N. B. For the condition in which this chest of plants and insects has been received, see not at the end of Secretary's Report, No. 2.

THE COMMITTEE'S REPORT ON COCHINEAL.

Proceedings of a Committee appointed at a General Meeting of the Agricultural Society of India, on the 8th August, 1838; for the purpose of reporting their opinion, agreeably to the Resolution passed on that occasion.

[Read at a General Meeting, 12th September, 1838.]

The Committee, after a careful perusal of the Papers laid before them, come to the opinion, that the insect brought from Bourbon, is not the species known as the *Grana Silvestre* in India, or at the Cape, and must therefore be either the *Grana Fina*, or a mixed breed, or the wild insect, altered and improved by cultivation.

Mons. Richard states distinctly, that the insect was brought from Cadiz in 1826—"a été introduite à Bourbon en 1826, sous le nom de *Grana Fina*, qui l'avait prise à Cadiz;" and Mons. Bedier says it was brought in 1826, in a king's ship (*l'Elephant*) which had touched at Cadiz.

It is a subject of history, that the true *Grana Fina* and Nopal were sent from Vera Cruz to Cadiz, by an individual, Don Pedro José Carraso, in 1820; we have therefore no reason to doubt, that the insects in our possession are derived from those imported from Cadiz to Bourbon, and are the *Grana Fina*.

(Signed) C. K. ROBISON,
W. CRACROFT,
W. F. FERGUSSON,
W. KERR EWART,
DAVID HARE, *Secretary*.

Resolved,—That this Report be confirmed.

Proceedings of a General Meeting held }
on the 12th September, 1838. }

(True Copy) JOHN BELL,
Secretary.

TO JOHN BELL, ESQ.

Secretary to the Agricultural and Horticultural Society.

MY DEAR SIR,

When the first supply of Cactus and Cochineal was received from Bourbon in January last, by the ship *Alcide*, I expressed a confident opinion, after inspecting the boxes in the Botanic Garden, where they were at first deposited, that the insects upon the plants were not of the species called *Grana Fina*, which furnishes the valuable Cochineal of commerce, but the *Grana Silvestre*, or wild species, in an improved condition; and when this opinion was called in question by yourself, I supported it by stating, that I had observed upon the Bourbon insects “a white silken coat, the sure characteristic of the *Silvestre*.” And when, in consequence of the discussion between us, and the notice taken of the subject by the Society, you produced a plant with the insect upon it, for the inspection of the Cochineal Committee at the Town Hall, where you invited me to meet them, I pointed out to yourself and other gentlemen, that every one of the insects upon the leaf had more or less of the silken coat, though a substance like the white powder of the *Grana Fina* was also apparent upon them. However, the letters since received from Mons. Bedier and Mons. Richard, explaining the source from which the Bourbon stock had been obtained, namely, from Cadiz, in 1826, from a plantation

originating in a supply of plants and insects transmitted to Cadiz from Mexico, in 1820, by Don José Carraso, with all the circumstances of which I was well acquainted—having been at Vera Cruz, and in intimate communication with Señor Carraso when the shipment took place—convinced me that the insect introduced into Bourbon must be the *Grana Fina*, whatever change it might have undergone, whether by degeneracy or by crossing the breed. That a plantation of *Grana Fina* might after a time degenerate into one of *Silvestre* only, if some insects of the latter species happened to be among the original stock, we have an example in the plantation established at St. Domingo, by Mons. Menonville, sixty years ago; and it appears by the “Instructions for rearing the Cochineal,” published by the “Cadiz Economical Society,” in 1825, (one of the Papers you have printed for our Society,) that the *Silvestre* has been observed among the *Grana Fina* insects propagated at Cadiz from the Vera Cruz stock. But all doubts are now removed by the condition in which the second supply has been received from Bourbon by the ship *Therence*, Captain Caillol, which you have now in your garden. Having seen the insects of this second importation, I have the satisfaction to concur with yourself, in pronouncing them to be the true *Grana Fina* of Oaxaca, and the Cactus upon which they have been sent up, I was glad to recognize as one of the fine thick long-leaved species, with few thorns upon it, which I had seen in the experimental garden of Señor Carraso at Vera Cruz. You have fortunately a large stock of it already, and it seems to thrive admirably in the beds you have made for it. The plants of the last importation have upon them some mother insects of larger size than any of the former batch, and without any silken coat whatever. Of course these insects could be no other than the *Grana Fina*.

The interest which the subject has excited, had in the mean time induced me to look over my collection of Notes and Papers upon Mexican affairs. Among them, I found a memorandum about Cochineal, copied from a Paper of Señor Carraso, containing the substance of his observations made in his experimental Nopaly, with some additional Notes in his own handwriting. In this Paper a more particular account is given, than I have elsewhere met with, of the different stages of the insect's existence, and a fact is there stated which had escaped my recollection, and which is not mentioned in any of the documents you have printed,—that in the second, or mid-

dle stage of its life, the female *Grana Fina* does resemble the *Silvestre* in being covered with a silken coat, which altogether disappears when it enters the third and last stage, which is the period of breeding. The difference between the appearance of the first and second batches of Bourbon Cochineal is thus accounted for by the difference in their age, none of the first batch having reached maturity on their arrival; and it is more than doubtful if the Cochineal mothers of that supply were ever impregnated, for they all died soon after, and the breed was lost, as you have already reported to the Society.

I now place at the Society's disposition a translation of Señor Carraso's Notes, and a memoir of my own written in 1820, shortly after my return from Vera Cruz, in the form of a letter to a brother in India, with the object of calling the attention of the Bengal Government to the importance of this branch of agriculture. Shortly after despatching the letter, I mentioned the subject to the late Dr. Wilkins, and at his suggestion made a proposition to the Court of Directors, offering, through my private correspondence with Vera Cruz, to procure the *Grana Fina* in a living state, and send it out to India at my own expense, upon condition that I should receive a premium of 1000*l.* from the Company in the event of success. The proposition was immediately accepted, and I wrote to a Spanish friend at Vera Cruz, on whose agency I could rely, but before the letter reached him, Iturbide had raised the standard of revolt, and all communication between that city and the interior was cut off; and the revolution which very quickly ensued, obliged my friend, with all the other Europeans who could escape, to embark for Europe. My efforts to procure the Cochineal insect through that channel were consequently disappointed, and my correspondence with Mexico was at an end.

I have said that the Court readily accepted the offer of my services, with a prospective remuneration of 1000*l.* When I made the tender, I was not aware of any Standing Order upon the subject. However, a few days after the bargain was made, Mr. Robinson, the Chairman, who took a warm, and with respect to myself a very kind, interest in the matter, ordered the records of the India House to be searched, to ascertain what had been done before on the question of Cochineal; and sent me an extract from the records, with an intimation, conveyed through Dr. Wilkins, that as it appeared the Court had come to a resolution in 1808, to bestow a premium of

2000*l.* upon the first person who should introduce the *Grana Fina* into the Company's territories, in a fit state for propagation, which resolution had never been rescinded, he thought I might claim the larger premium, notwithstanding the bargain with me, in case I should succeed in procuring and introducing the insect. My efforts proved abortive, and circumstances are now very different from what they were eighteen years ago. While the East India Company's endeavours to procure the Cochineal were limited to the offer of a pecuniary reward too small to cover the expenses of a special mission to the country of its growth, the Government of France, more active in the promotion of new objects of colonial industry, availed itself of its political influence in Spain to procure it there; and, to our astonishment, we heard, for the first time in 1837, of the existence of the *Grana Fina* at Bourbon, since 1826, almost at our own doors. The Agricultural Society of Bengal, and not the East India Company, have the merit of the arrangements which have now happily succeeded in obtaining it from Bourbon. But as the Company, as well by their liberal support of the experiments at Madras with the *Silvestre* species half a century ago, as by the premium they subsequently offered have at least evinced their opinion of the importance of the acquisition to the agricultural interests of their Indian empire, I would suggest for the consideration of the Society, whether it would not be proper to ask the Court of Directors or the local Government to place the lapsed premium of 2000*l.* at our disposition, in order that the money may be devoted to the purpose of securing repeated supplies of plants and insects, and extending their cultivation in such parts of India as experiment shall prove to be best suited by climate, or otherwise, to the rearing of this valuable product. The extract from the Company's Records is sent herewith for the information of my brother members.

I am, my dear Sir,
Yours very truly,

G. A. PRINSEP.

Calcutta. 11th September, 1838.

Translation of a Memorandum on the subject of Cochineal.

Extracted from the Papers of DON PEDRO JOSE' CARRASO, at Vera Cruz, in 1820, with Notes appended by himself after revising the Extract.

(1.) This product, peculiar to the province of Oaxaca, in New Spain (Mexico), is known under two principal denominations—*Grana Fina*, or fine Cochineal, and *Grana Silvestre*, or wild Cochineal. (2.) The latter, though not cultivated at all, nor collected any where but in Oaxaca, (3) is found in various parts of the *tierra caliente* (hot districts) of the kingdom of New Spain, wherever there exists the oval or round-leaved species of Nopal (Cactus) called.

(4) The former is never met with in a wild state, and though capable of being propagated upon the same species of Nopal as the other, is reared, by preference, upon another species, having a longer and thicker and less thorny leaf, with a fine down upon it like velvet. The Insects of both species will bear a considerable variety of temperature, being neither destroyed by the cold north winds, nor by the greatest heat of the sun, but very frequently by heavy rain.

It is not true, as stated by Humboldt, that the Indians make them migrate from one climate to another, as the seasons change. What they do is, to sell the live insects when they reach the period of parturition, for the purpose of distribution among the Nopaleries of the cultivators round about.

M. Thierry de Menonville introduced himself into the country as a physician, in the time of the Viceroy Bucareli, and penetrated into the province of Oaxaca, where he studied the nature of the cultivation, and succeeded in carrying off some of the insects and Nopal plants to the Island of St. Domingo, by commission from Lewis XVI., who appointed botanists to propagate the Insect; and in the year 1787, a treatise upon Nopals and the cultivation of Cochineal was published there by M. Thierry himself. But it all ended in nothing; and it is to be supposed, either that there are physical causes of climate, which prevent the propagation elsewhere, or that it requires much practical knowledge, and the extreme patience of the Indian, to insure its proper treatment.

The *Grana Fina*—There are three periods in the life of the

Cochineal insect. It is viviparous, and at its birth of the size of a*... At that period the microscope discovers no difference between the sexes. It then has legs bearing about the same proportion to its body, as those of the common black beetle in England, which is of nearly the same shape; but they grow very little, while the body becomes comparatively very large. The insect, which at all times is very torpid, at its birth spreads over the nearest parts of the leaf, so as to cover it with little spots; and though every mother Cochineal produces above a hundred, three or four mother insects are required to cover one side of a leaf, the mortality being great, as with the spawn of fish, which perish for the most part immediately, no one has discovered why. The survivors continually increase in bulk, and become coated with a large fleece of very white silk, similar to that of the *Grana Silvestre*. This period lasts 35 or 40 days; the insects then huddle together one upon another, to appearance, so that at a little distance nothing is seen but a white patch of cotton of uneven surface. In this state they remain 35 or 40 days more, after which the sexes are very distinctly recognizable. The male becomes a fly about half a line in length, with a thin body and two wings, like those of a winged ant: the female is then round, and two or three times larger than the male, has no wings, and is impregnated by the male,—which dies in a few days; while the female continues to grow bigger and bigger for another term, equal to each of the former periods, till she attains her full size, when she sheds her young, and dies immediately afterwards. So the life of the female Cochineal is about four months, and that of the male scarcely more than two months and a half. The male insects are almost as numerous as the female, but are of no value. The females are collected just before they begin to yield their young. In place of the silken fleece, which they lose at the period of the second mutation, they are then covered with a white powder, and being killed in this state and dried in the sun, they form the white (silver) Cochineal of commerce. The black Cochineal is the animal which has died naturally after parturition.

Procreation goes on all the year, and on the same leaf may be seen insects in all the three stages at the same time. The insect fixes itself to the leaf only on entering the first and the second

* The Spanish word is illegible. The new-born Cochineal is so very small as to be scarcely visible without a microscope.—G. A. P.

stages of its existence; during the third, the female remains fixed to the spot where the grouping or clustering of the young insects took place at the previous stage. The insects are applied to the plant by the Indians in little purses made of a bark they call *palmito*, which, after a little rubbing, becomes an open and elastic web. These they pin to the leaf with the thorn of the Cactus, giving a separate purse to every mother Cochineal, and thus the young insects are enabled to pass easily to the leaf. The insect will live a fortnight after being detached from the Nopal.

NOTES BY SENOR CARRASO.

(1.) Formerly, Cochineal was reared in other provinces, for instance in Puebla and Mexico: but the cultivation was discontinued there, because the population found more profitable occupation, or more easy and more certain returns for their labour and outlay.

(2.) The two species are not two varieties—the *Grana Fina* may be considered as merely an improvement of the *Silvestre*.

(3.) The *Silvestre* is found in the environs of Vera Cruz and various parts of the province of Oaxaca, in the Nuevo Reyno de Leon, and other parts of the kingdom, and it propagates itself very rapidly. It is collected and sold at a very low price, say 6 to 8 dollars per arrobe (26 pounds English). The dye it yields, though in less quantity than that of the *Grana Fina*, perhaps on account of its silky coat, is as fast and good a colour as that of the other species.

(4.) There are a few spots in the province of Oaxaca, where the *Grana Fina* is found existing without cultivation. If a large healthy Nopal be once covered with the *Grana Fina*, the generation will go on, so long as no accident shall destroy it altogether, such as violent showers of rain or an abundance of those insects which are enemies of the Cochineal. In this manner it is easy to account for the existence of the fine Cochineal in some places, where, after taking the crop from the Nopals, some mother Cochineals may chance to have remained concealed, or young insects may have been left upon the plant unobserved, or uncared for, when these were abandoned. Some persons think it not impossible that the wind may carry the young of the *Grana Silvestre* to Nopals growing wild.

ACCOUNT OF THE METHOD OF CULTIVATING THE
COCHINEAL INSECT IN THE PROVINCE OF OAXACA,

*With practical Observations, &c. communicated in a letter from
G. A. Prinsep, Esq. dated London, September 20th, 1820, to
H. T. Prinsep, Esq. Calcutta.*

[Presented to the Agricultural Society by Mr. G. A. Prinsep, 12th Sept. 1838.]

In my letter of the 14th ultimo, I promised you an explanation of the mode of cultivating the Cochineal, which I proposed to draw up chiefly from a Spanish treatise published at Mexico in 1794, in various numbers of the *Gazeta de Literatura*. I shall not however enter so largely into the subject as I intended, as well because I find a pretty full account in Humboldt's Political Essay on New Spain, taken from the same source, as because my zeal is very much damped by the discovery that the Cochineal I have brought from Campeachy, is not the powdery sort—*Grana Fina*—as the owner of the plantation imagined, but merely the cottony *Silvestre*, which has been already introduced into Bengal by Captain Neilson, in 1795, from the Braziis, and exists also in the Royal Gardens at Kew, as I have myself ascertained. Still however I send it out to you, both because it is upon a good Cactus, perfectly free from prickles—possibly better than the kind you have—and likewise because I have noticed a great difference in the size of the *Silvestre* in different places; that which I collected in the woods of Vera Cruz, being in the second generation less than one-fourth the size of what my Campeachy breed has yielded since its introduction into England: whereas some grains of the latter are nearly as large as the *Fina*. It was this difference that deceived the Director of the Botanic Garden at the Havannah, as well as myself, leading us to believe that both were in my possession.

There is scarcely any perceptible distinction by the microscope between the two species at their birth, when they much resemble a speck of fine ground pepper; and as the quality of their dye is equal, and the males are always the same in size and appearance, the full grown female of the *Silvestre* being only smaller, but otherwise like the fine sort, when the one is divested of its cotton and the other of its powder, it has been conjectured by some naturalists that they spring from a common origin, the change being effected by long cultivation. This opinion seems rather supported by the variation in size observed in the *Silvestre* according to the circumstances of its pro-

pagation ; and still more by the fact, that the latter extends itself throughout the tropical parts of America, whereas the former was known only in Mexico at the period of the Conquest, and becomes extinct everywhere, when deprived of the care of the cultivator, unless favoured by particular advantages of situation. The *Silvestre*, on the contrary, is so difficult to eradicate, that although not a trace of it can be discovered in the environs of Vera Cruz during the prevalence of the violent north winds, the wild Cactus bushes are full of it by the end of April.

The author of the treatise before me asserts, in contradiction to the common belief, that the Cochineal is not viviparous, although it is difficult to discern the operation of quitting the egg, which takes place almost immediately after it is shed. These eggs, he observes, are only of the diameter of four hairs, and supposing that of a mother Cochineal to be one-twelfth of an inch at her full size, he estimates that she might contain the enormous quantity of 632,777 eggs. An intelligent gentleman (Carraso, the tobacco factor) who had dedicated himself some months to a little experimental plantation in the town of Vera Cruz, told me he conceived that upwards of a thousand were born from every mother, the great part of whom died almost immediately from unknown causes—many, no doubt, because they strayed too far from their provender, or were blown away by the wind. After shedding the whole of her eggs, the mother dies, and becomes quite a shell, turning black. When the little insects are born, no difference can be distinguished in the sexes by the most powerful microscope ; in this state they are all equally active, seeming to profit eagerly of the short period during which motion is allowed them. After some days they attach themselves to the plant, and from that moment the female never quits her hold ; a cottony coat grows over her, which falls off in 13 to 15 days in the fine sort, but continually increases in the *Silvestre* ; the male also adheres to the plant, and in about 12 days becomes enveloped in a cottony cylindrical purse, closed at the top, where only it is attached to the leaf, in the *Silvestre*, (generally in clusters to the web of the female,) and always open at the bottom :—the length of this purse is about equal to the size of a full grown female, being about twice that of its breadth. The male forms his purse or chrysalis in 48 hours, and in four days afterwards, he comes out a fly with two transparent wings, about three times the length of his body, which exactly cover each other when at rest, appearing only

as one ; besides which, he is provided with two poisers or tails projecting under his wings beyond their extremities, and with two hairy antennæ, of the length of his body ; he has also six legs, and six immovable eyes in his head. He is now again become active (particularly an hour after sunrise) but rarely takes to the wing, being easily carried away by the wind. The proportion of males appears very small, although there were more in the state of chrysalis than females. The female is about five weeks old when her cottony coat is succeeded by a fine white powder, in the *Grana Fina*. The females of both species go on increasing in roundness till about three months old, when they begin to yield their young : this continues 12 or 14 days, during the whole of which the insect is in a torpid state, and may be detached from the plant : she has previously an amber-coloured liquid globule, varying in size according to the abundance of juice in the Cactus, which has been thought to indicate the maturity of her pregnancy. It is remarkable, that from the moment of her fixing upon the plant, she loses her eyes and the form of her head : instead of a mouth, she has an extremely fine proboscis, which it is supposed she introduces into the imperceptible pores of the leaf she feeds on ; and such is her excessive torpor, that, once removed, she will not attach herself again ; this might however arise from the breaking of the proboscis, for some instances are quoted of the *Silvestre* mothers having survived removal. She has two very short antennæ, and six extremely small legs, which become useless from their not growing after her body begins to swell out. The natural life of the male does not exceed two months and a half ; that of the female is reckoned to be nearly four months, but in cold climates it is sometimes more, and in the very hot districts it is less. I am inclined to believe the *Silvestre* goes through the functions of its existence more rapidly than the other species, for a *penca* or Cactus leaf I introduced into the forcing hot-beds of the Chelsea Gardens on the 21st July ; with but a few Cochineal mothers upon it, was covered with about 100 full-grown, and 200 pretty large insects, besides 2 or 300 small ones attached, when I brought it away on the 13th September, although on my arrival there was very little young Cochineal left by the accidents of the voyage. I also observed a couple of nearly full-grown mothers upon another species of Cactus in the garden, impregnated from mine. It seems certain that the life of this insect varies considerably, according to the temperature :—the hot-house which the

plants were placed in at Chelsea, was warmer than their native climate on an average of the 24 hours, on account of the length of the day in our summer, and because the heat was kept up at night by the fermentation of bark under closed glasses, beyond that of the plains of Vera Cruz and Campeachy.

It has been noticed, that the varieties of Cactus on which the fine Cochineal is principally reared, are not found in a wild state, and Humboldt, following the Report on Cochineal of Don Francisco Ibañez de Corvera, adds, that it takes freely upon the largest species called *Tuna d: Castilla*. Confiding in this information, I brought home a number of very fine pencas of this Cactus, but soon discovered that it would not maintain my Cochineal at all, for all my endeavours could not fix a single insect upon it. The leaves of this plant seem to the eye perfectly adapted to the cultivation, being solid and of the extraordinary dimensions of 12 to 14 inches broad, and 18 to 20 long. The experiments of Carraso at Vera Cruz, assured him that the two insects were so perfectly alike in regard to their nourishment, that the same Cactus that would feed the one, would invariably maintain the other; so that the existence of the *Silvestre* upon a wild Nopal is a certain indication that it will take the fine Cochineal, and vice versâ. That gentleman had procured plants of all the varieties of Nopal grown for the purpose in New Spain, which I think were of six kinds; the best being very thick and of a dark bluish green, and having a rough velvety skin, free from thorns when the leaves are of full size. It is not merely the last circumstance that is to be attended to, for one or two excellent Nopals have them very long, but are without those clusters of fine thorns abounding in others which render it difficult and tedious to detach the insect. The five or six kinds of Nopal cultivated for the Cochineal bear very little fruit, and have the property of not being injured by the insect; whereas other species, luxuriant in fruit, and of a more delicate skin, are so wounded by it, that the leaves covered with it soon wither as far as the joint:—this may not improbably arise from the avidity with which it attacks them; if so, the superior abundance of their produce might compensate for the necessity of renewing the plantation. The sort I have consigned to you is, I apprehend, of this latter description to a certain degree, for the wounds of the animal become white spots, which, if the penca be much loaded, spread into each other, and cause it to mortify, especially while tender; but this might not happen with the *Grana Fina*, which is not so destructive.

The fruit of many Nopals yields a juice equal in colour to the Cochineal dye, and I believe this is a sure sign that the insect will live upon them. Hence the opinion quoted, and I am surprised to find credited by Humboldt, that the dye of the Cochineal does not arise entirely from a process of animalization. It is however certain that all the experiments made to produce a *fixed* colour from the juice of the fruit and from that of the plant, which is also in some cases of the same tint, have entirely failed, although several individuals are still ardent in the investigation; were such a discovery once made, our mulberries, our cherries, and our blackberries, might supersede many of those expensive drugs which annually cost large sums to the nation. Indeed the fallacy of this opinion is sufficiently evident from the fact, that the best Cactus for the Cochineal has a *white* fruit, and it has been ascertained that what feeds upon the red fruit itself does not give a finer colour than what is taken from the leaves or even from the knots of the plant. The large yellow fruit, with a light green skin, usually called *Higos de Tuna*, much prized at Vera Cruz which is supplied with it from Tehuacan, is, I believe, furnished by the *Tuna de Castilla*. The Mexicans distinguish the various species reserved for the Cochineal by the name of *Tlal Nopal* signifying dye-yielding Nopal.

I have heard it asserted by Dr. Fleming that the wild Cochineal introduced into India attacked not only the native Cactus, but even hedges of Euphorbia and other plants, doing great damage in the gardens of the Europeans. This must be erroneous of course, since it will not even feed upon all kinds of Cactus. Experiments made in Mexico have determined that nothing but the Cactus will do for it, and that it will not fix upon the analogous plants known there under the names of *Pitahaya*, or *Cirius*,—*Viznaga*, or *Tecocomill*, &c.

No account had been drawn up of this interesting cultivation in New Spain, until the Conde de Tepa (afterwards member of the Supreme Council of the Indies) during his residence at Mexico, procured reports from those parts of the kingdom where it was still an object of attention. From them chiefly, as quoted by Alzate in the *Gazeta de Literatura*, I derive the substance of the following observations.

At present the fine Cochineal is exclusively reared in the province of Oaxaca, between the latitudes of about 16° and 18° north, and at an absolute elevation of 2 to 5000 feet. Shortly after the Conquest it

was much more spread over the country, and there are *ordinanzas* of 1592 and 1593, which make particular allusion to the crops of Tlascalala, Huejocingo, Cholula, Tepeaca, and other places between 7 and 8000 feet above the level of the sea, and between the latitudes of 19° and 20°.

The increased value of lands in those districts for the rearing of cattle and the food of man, with the progressive increase of population, has no doubt produced the abandonment of a less profitable industry so near the capital. But the relative proportion of *Silvestre* was formerly much greater than it is now, and I incline to doubt whether the *Grana Fina* was actually propagated in regions so much exposed to frost during several months in the year; the other is much more hardy, and was seen by Humboldt in situations still more elevated.

The Nopals are planted immediately before or after the rains, which begin almost universally in June, and last till October:—on the mountains near the city of Oaxaca the season is reversed, and the rains continue from November to February and March, being occasioned by the condensation of the clouds during the north winds, which circumstance affords opportunity for a crop of Cochineal in the summer months, when the rains destroy it in the Nopalries of the low country. A spot of ground is cleared by felling the trees, firing the grass, brushwood, &c.; they then make holes in the ground about 8 inches deep, and 11 or 12 in diameter, 5 or 6 feet apart, in straight rows, and place three separate pencas (or leaves) in each against the sides of the holes, allowing the air to get at the bottom of the leaf; because they know, from experience, that if the wound caused by breaking it off from its mother plant, be not healed before covering it up, the penca will infallibly die. Care is taken to weed the ground at least twice a year, without touching the Nopals with the hoe, to prevent the *Silvestre* from getting into the plantation. The third year (or the fourth in the colder regions) the insect may be applied,—which is done in August and September in the environs of Oaxaca, in September and October in some other places, and in November and December where the rains are long protracted. In short, they begin sowing (as they term it) as soon as the heavy rains are over. The mode of laying on the seed in Mexico is to put a few mother Cochineals, when beginning to shed their young, into a little nest of *paxtle*—a parasitical plant, or substance like a net, hanging abun-

dantly from the branches of certain trees, or the fibrous exterior coat of the palm tree—which they attach to the penca with a Cactus thorn, and in a few days the little insects are observed travelling all over the Nopals, to choose for themselves the most luxuriant spots to fix on. Two or three mother Cochineals are sufficient for a single leaf, and it is calculated that every plant has 15 serviceable leaves, or pencas, upon an average ; but owing to the great waste that occurs, I find it stated in one report, that every 40 plants require a pound of Cochineal mothers, which in that state may be estimated to consist of about 4000. Sometimes the mothers, when half exhausted, are removed to supply other plants ; after which they are collected and dried, forming the crop called *Zacate*, of trifling value, and yielding four ounces for every pound applied. The Cochineal sown in September may be taken off by the beginning of January, when just on the point of shedding its young : a few mothers are left to people the leaves afresh ; the gathering does not commence till they are sufficiently covered with young insects : and in May, a second crop is taken, which is the great one ; a third is said to be gathered in two villages, but I know of no other instance of constant repetition, except by the contrivance of carrying the insect to the mountains, when it does not rain in the summer, by which means some Indians near the capital of Oaxaca find profitable employment during that period. There are elevated situations where the summer rains spare a great part of the Cochineal exposed to them, so that two crops may be obtained during the rest of the year, to compensate for the loss of one in the winter. Contrivances are also adopted to check the influence of the cold by covering the plants with a light kind of matting, and the seed is preserved by the Indians throughout the year by keeping a quantity of pencas, either during the rains or in the cold weather according to situation, hung up or placed in upright rows upon the earth, under the roofs of their houses. It is observed that, when the plants grow in a slanting position, the rain will not destroy the Cochineal on that side of the penca which has inclination towards the ground.

There is an inequality in the seasons at a distance from the sea coast : and while not a drop of rain falls near the latter from January to the end of May, there is occasionally a severe hail storm, or drenching shower, in the low lands near the Cordilleras in March and April ; the one beats off the insect and wounds the Nopal ; the

other produces what is called a *chorreo*—a stream of diluted Cochineal blood dripping from the leaves.

Ulloa describes differently the mode of preserving and sowing the Cochineal in Tucuman, where it was still cultivated in his time. There, it seems, they did not deem it necessary to cut off pencas for the former purpose, but merely collected a number of mothers in a basket, which they kept carefully closed till the sowing season, when, on applying them to the plantations, the young became animated and soon covered the Nopals. This method economizes the latter, but appears more likely to occasion waste of the insect. If it be true that the young Cochineal survives his long confinement without nourishment, it must be inferred that he remains in the egg all the time, for want of the sufficient heat to bring him to life. Other facts give rise to the same inference, the author of the Spanish Treatise having himself observed the birth of young Cochineals after confining the mothers eight months. The same writer also ascertained, by several experiments, that the young insect would live three weeks from its birth without food; and I also can assert, that some young Cochineals which I had placed upon the Tuna de Castilla wandered about for that period before they perished, being unable to derive sustenance from the plant.

Nopalries well cultivated do not require to be renewed until after 15 years. The patience of the Indians, who alone attend them, is remarkable; it is said they will sit for hours clearing a single plant from the numerous enemies to which the Cochineal is exposed. Many have consequently imagined that no other class of persons are competent for its propagation; but there is no doubt, from the general habits of the Mexican Indians, and the want of system in the employment of their time, so visible in every species of industry, that a more intelligent race would render the produce of their labour considerably greater.

The celebrated Viceroy, Count Revillagigedo, in his excellent instructions to his successor, states the number of Indians occupied in this cultivation, to have been 25 or 30,000 altogether, at the period of his government, which lasted from 1789 to 1794, when the annual crop amounted to 22,600 arrobas. But there are many who only rear a few Nopals, turning their chief attention to other modes of subsistence; and a considerable proportion of the quantity brought to market, according to a recent report of the present *veedor*, is carried into

the city of Oaxaca in parcels of a few pounds only. It would not be exaggeration to estimate that, under better arrangements, the crop might be doubled with the same strength of hands.

Care must be taken that the Nopals be not overloaded: about 50 is the number of insects deemed sufficient upon each leaf, but I have counted more than 500 upon one penca covered with the *Silvestre*. The double harvest is reckoned to yield altogether nearly fifty-fold.

It is observed that the crops are less abundant in the cold than in the hot districts, notwithstanding the greater number of enemies that attack the insect in the latter, which require the constant attention of the cultivator.

Don Pantaleon Ruiz de Montoya states in his report upon the Nopalries of his Alcaaldia, (Magistrate's jurisdiction) of Nexapo, that a pound of Cochineal mothers, applied to the plants in October, yields twelve pounds in January, and the mothers before they are taken off being suffered to shed half their young, 36 lbs. are collected at the beginning of May. Don Francisco Ibanez de Corbera says that, in the district of Zimatlan, from 2 or 3 lbs. of mothers applied in October, they gather three times that weight in January, and three arrobas or 75 lbs. in May or June; besides which, they get 2 or 3 lbs. from 1 lb. of seed sown in the two months last named.

The usual practice is to sweep the plants perfectly clean at the commencement of the rains, in order to allow them to recover from the heavy crop they have just borne, before the autumn. The natives are likewise careful to remove the dust very lightly with a deer's tail, and especially to destroy the *Silvestre* when discovered, for it would soon displace the other.

There are various ways of drying the Cochineal. Some put it for a few minutes into water nearly boiling, which deprives it of its powder: hence the black Cochineal, preferred in some countries, especially in England. Others put it into jars surrounded by boiling water. Some set it in baskets over the steam of a boiling cauldron. Some put it into the Mexican hot stoves called *Temuscales*, in which an Indian will bake himself for an hour or two at a very high temperature, (Alzate says 53° Reaumur.) Others set it in earthen vessels over a regulated fire. And, finally, many simply place it in the sun.

The three last are the commonest methods, but that of exposure to the sun is said to cause the greatest diminution of weight, which

probably arises from the mothers not dying before they have shed a large proportion of their young. When water is used, the Cochineal is afterwards dried in the sun. The general loss of weight by drying is roundly estimated at two-thirds, which may be considered full three-fourths by the time of its consumption after the process of sifting in Europe.

It may appear extraordinary that the Spaniards and the French should prefer the silvery or powdered state, while the English give five per cent. more for the black Cochineal, both yielding a dye of precisely the same quality. No doubt the powder bears some proportion to the weight; but in this state fraud is more easily detected, and it is observed that the black Cochineal prepared at Cadiz from the other, for the London market, is in general inferior to that which comes direct from Vera Cruz: indeed the former begins to be looked at with suspicion, and a decided preference is given to the latter when their appearance is exactly alike. The black, if genuine, always appears more shelly than the other; and I think it probable, judging from an imperfect trial of a parcel of both sorts, that the water-process occasions considerable waste; for a few grains of Cochineal thrown into water much below the boiling point, will colour it immediately.

I have no account of the mode of collecting and preparing the *Silvestre*, nor have I had opportunities of seeing it in a merchantable state, excepting a small sample shewn me in London, which looked a good deal like the drug supplied from India under the name of Cochineal, of much the same value: in short, it seemed a blackish concentrated paste broken into grains similar in size to those of the real Cochineal. I was however informed, that it has also been imported in the same state as the latter, and nearly divested of its cottony coat; but the importation of it has been so rare that its relative value in this state cannot be mentioned. Could the silky substance be entirely separated, the wild insect ought, when prepared in the same way, to be not very much less valuable than the cultivated one. The quality of its dye is considered as good,—say equal to one-third in strength, in the condition in which it is now brought to market; and the Mexicans use it instead of the other in the manufactures of the country. From an experiment made by myself, upon a very small scale, I conceive that almost the whole of the cotton might be removed by shaking it when half dry in a canvas screening sieve. The propor-

tion at present collected is small, and none has been exported from Vera Cruz since 1817, when 66 arrobas shipped were valued at 16 dollars per arroba, while the *Grana Fina* was rated at 130 dollars. Previous to that instance, the latest that occurred was in 1809, when 71 arrobas exported were estimated at 40 dollars in the annual *Balanzas* (or commercial returns) of Vera Cruz; the *Grana Fina* being valued therein at 120 dollars. Humboldt had asserted that the *Silvestre* could be bought for 6 and 8 dollars the arroba; but the author of the Spanish Treatise on Cochineal gives a value to it scarcely less than one-half that of the other, and moreover states his belief, that the reduction in price was fully compensated by the facility of getting a crop from uncultivated Nopals, without the necessity of renewing either the seed or the plantation.

It is in both cases the female only which produces the dye; the male is of no use whatever except for the purpose of generation, and if a proportion of the white purses gets among the crop, its saleable value is diminished. From carelessness, and sometimes also from fraud, a quantity of dust and small stones is mixed with the Cochineal; so that notwithstanding the examination of the public *veedor* at Oaxaca, nobody will buy it in London until it has undergone the screening process in the Dock Warehouses, by which the weight is considerably reduced, and an expense incurred that ought to be avoided.

Although the Mexicans have their Nopalries in elevated situations, with respect to the level of the sea, they are careful to select spots well sheltered from the north winds, and the greater the elevation, the more attention is paid to placing them at the foot of hills in ravines where there is considerable condensation of the rays of the sun. I have myself observed the wild Cochineal thriving in the low country against a palm which must at times have been heated to 140°; and some that I placed in that temperature, by concentrating the power of the sun, since my arrival in England, did not appear to suffer until after several trials I brought the heat up to 150°, when the insects died and the upper part of the plant withered, the rest remaining so sound that it shot up again as soon as the rotten part was removed.

How is it that the *Silvestre* species of Cochineal did not answer in India, notwithstanding the zeal of Dr. Anderson of Madras, and various other Europeans who spread it over the country? Was it that the Cactus provided was so wounded by the voracity of the

insect, that it became necessary constantly to renew the plantation? Was it that these were committed too young to their destroyer? Was it for want of knowing the best means of preparing it for a market? Or because the species was a small degenerated *Silvestre*? Or was it perhaps because the experiment was exclusively made by Englishmen in their usual way, with costly establishments, and on lands more valuable for other purposes? Unable to form a judgment on these points, I will merely remark, that as the Cactus will grow in sandy or stony soils unfit for any thing else, and even in the crack of a wall, it were folly to assign it lands subject to high rent and taxation, merely to propagate an inferior kind of Cochineal, which in its own country is gathered from the sides of mountains and sand-hills. Colebrooke, in the second edition of his Treatise on the Agriculture of Bengal, slightly noticing the Cochineal, suggests that it might still answer in the hands of the natives of India; and I have lately heard the same opinion from himself, supposing that premiums, or other encouragement, with the necessary instructions, were offered them.

But would it not be worth while to endeavour to get hold of the *Grana Fina*? Would it be unworthy the consideration of the governors of our Eastern empire, whether a premium might not be proposed for its introduction? It was in my own power to have brought it from Vera Cruz where it existed in an experimental garden to which I had free access, but I would not abuse the confidence of the proprietor. However, I could obtain it through another channel, were I at liberty to offer a sum of money as the best means of securing the zeal and attention of the party in contemplation. In that case it would be procured from Oaxaca, with the several varieties of the best Cactus, and conveyed to the coast on the shoulders of Indians, a distance of 100 leagues, and it might be got away privately in His Majesty's ships which visit the port of Vera Cruz every two or three months. I mean to talk to Dr. Wilkins the Librarian, on the subject, who favours the idea: he told my father that it cost the Company 3000*l.* sterling to introduce the *Silvestre*.

I find I have been more diffuse in this letter than I intended;—you will therefore agree with me that it is high time to conclude.

EXTRACT FROM THE INDIA-HOUSE RECORDS.

[Presented to the Agricultural Society by G. A. Prinsep, Esq.—Submitted at a General Meeting on the 12th September, 1838.]

Measures which have been pursued by the Court of Directors and the Governments in India, with a view to the introduction of the TRUE COCHINEAL INSECT into the British Territories in India.

In December, 1786, Dr. James Anderson, the Company's Physician-General at Madras, reported to the Government that he had found the Cochineal insect attached to the *Aosungirike*, or Loll Grass, the common food of the horses, and which was found upon experiment to communicate colour to water and to spirits of wine, equal to the Cochineal of Mexico; and that, with a view to avoid the expense of collecting it from the fields, and to make it an article of traffic from the coast, he had planted a small piece of ground with the grass, and placed the insects on it. At Dr. Anderson's request a specimen of this Cochineal, prepared by him, was forwarded to the Court of Directors; by whose order it was subjected to various experiments in England, under the direction of Sir Joseph Banks, and found to be entirely useless in dyeing. The Court directed, in consequence, that no further notice should be taken of it.

But at the instance of the Committee of Warehouses, who reported upon the subject in March, 1788, sealed orders were given to the Captains of some ships proceeding to the Brazils, to procure, if possible, some of the real insect and carry it to the coast.

Dr. Anderson was in the meantime permitted to establish, under Dr. Berry as Superintendent, at a limited expense, a garden to be called the Company's Nopalry, for the cultivation of Nopal (a plant upon which the genuine insect was cultivated), and to stock it with Nopals which he had procured from China, from England, and from Mexico by way of Manilla. He was also permitted, in expectation of the arrival of the insect, to erect a conservatory for its reception.

In a subsequent letter to Government, Dr. Anderson stated that the insects discovered by him had been examined by the Spaniards, and allowed by them, as well as the Botanist to the Royal Company of the Phillippines, to be Cochineal insects; but he was afterwards convinced that the *Grana Fina* of Mexico, the species that bore so high a value in Europe, and which was the *desideratum*, was a pe-

cular species, and he offered some further suggestions as to the best mode of procuring it, particularly that of furnishing navigators with printed instructions for its preservation.

In a letter dated 20th October, 1789, Dr. Anderson observed—
“ I have frequently had occasion to notice, that the Spaniards were of opinion the genuine Cochineal could only be cultivated to advantage with them, and it is not impossible they have reasons for thinking so; but until we have made many experiments, we should not be convinced, as the welfare of the country, the trade of Great Britain, and the information of the learned, required us to proceed.”

In this letter Dr. Anderson stated some facts, from which it appeared to him that the insect could be obtained with ease, and particularly described the treatment which the plants and insects ought to have on their passage across the ocean. The Government, however, did not deem it expedient to adopt the plan of distributing printed instruction among naval men indiscriminately, but it had been done before their decision was known.

In June, 1791, Dr. Anderson had ascertained that the Nopal plant was in a thriving state at St. Vincent's, in the West Indies, and on the Island of St. Helena. He therefore suggested the practicability of establishing the Cochineal insect from Mexico at St. Vincent's, of conveying it thence to St. Helena, and afterwards to India.

Upon the arrival of Dr. Anderson's further communications in England, they were transmitted to Sir Joseph Banks, and the expenses of the Nopalry were, in 1792, limited by the Court of Directors, to 200 pagodas per month.

The sum of pagodas 13,397 : 16 : 20 was also paid to Dr. Anderson in 1795, in pursuance of the Court's orders, on account of the expenses incurred by him in introducing the silk manufacture and Cochineal on the coast.

In June, 1795, Dr. Roxburgh, the Superintendent of the Company's Botanical Garden at Calcutta, reported to the Bengal Government, that Captain Neilson, of H. M. S. had imported from Brazil, and delivered to him, some Cochineal of the kind called by the Americans *Silvestre*; and previous to the distribution of the insects, it was resolved that an experiment should be made of the dye to be obtained from them, for which purpose a parcel was delivered to Dr. Dinwiddie.—Captain Neilson in the meantime received the acknowledgments of the Bengal Government for the acquisition, and was advised that

its value could only be ascertained by experiment, and that it would afford the Government peculiar satisfaction to inform the Court that a valuable article of commerce had been introduced into the country by his means.

In October following, a report from Dr. Dinwiddie was submitted to the Government, which stated the result of the experiments made by him to be, that *two pounds* of the Bengal Cochineal was equal to *one* of the best Mexican or *mastique*. This report was transmitted to the Court of Directors.

A portion of the Cochineal insects imported by Captain Neilson having been forwarded to Madras, addressed to Dr. Anderson, was immediately given in charge to the Superintendent of the Company's Nopalry at that Presidency, Dr. Andrew Berry, who reported favourably of the culture of the insects, dwelling particularly on their hardiness, and the facility with which they might be preserved. The Collectors of the Revenue were each furnished with a small quantity, and directed to exert themselves in the most strenuous manner, for the purpose of securing to the public the full advantage of so valuable an acquisition; with a view to which they were directed to enclose spots of ground fifty or sixty feet square, at some of the *curbah* villages under each Collector.

Two further reports were received early in 1796 from Dr. Berry, with a small quantity of dried Cochineal, and two specimens of the colour produced by that reared on the coast. In these reports Dr. Berry continued to express very favourable opinions of the quality of the Cochineal reared in India, which was stated to dye Casimere cloth and flannel with a colour equal in brightness to the best scarlet. It appeared however from these reports, that to produce the same colour as that produced by the *Grana Fina*, four times the quantity of the *Silvestre* Cochineal, reared in India, was requisite. These Papers were transmitted to the Court of Directors.

In March, 1796, the Madras Government having determined to hold out the most solid encouragement to the manufacturers of Cochineal, called upon Dr. Berry to report his opinion as to the price which it might be expedient for the Company to offer to such of the natives as might be disposed to employ their industry in its culture. In reply, he offered it as his opinion that one pagoda per pound might be offered, and would be such a liberal allowance as would encourage the cultivation. Directions were accordingly given to the Board of

Revenue to authorize the Collectors to purchase Cochineal from the inhabitants, at the rate of one star pagoda per pound. Samples of the Cochineal so procured were transmitted to the Court of Directors.

After several inquiries made in England, with a view to ascertain the quality of the Cochineal transmitted from Bengal and Fort St. George, as the produce of the insects imported by Captain Neilson, the Court of Directors, in reply to the despatches from the former Presidency, observed—"The specimens of Cochineal forwarded by Dr. Roxburgh and Mr. Faswell, as also two parcels sent from the coast by Dr. Anderson and Dr. Berry, the whole raised from the insects procured at Rio Janciro by Capt. Neilson, have been shewn to some of the best judges of the commodity in the kingdom, who all agree, that it is the *Silvestre*, or wild species, and that there is little prospect of its being cultivated to any advantage for the supply of the Europe market, unless it could be afforded at about one-third of the price of the *Grana Fina*, or at from 5*s.* to 6*s.* per pound, freight and all charges included." The Court at the same time adverting to the more favourable opinion of Dr. Dinwiddie, resolved to have trial made of it upon a larger scale, and ordered it to be given into the hands of the Company's dyers in England: they also directed the Bengal Government not to engage in any measure that might lead to expense, until they might be put in possession of the Court's further instructions.

At the average price of nearly one pagoda per pound, the Madras Government had collected in September, 1797, 21,744lbs. and fresh supplies were then daily coming in. In consequence the sanction of the Governor in Council was obtained by the Board of Revenue, in consideration of the consent of the Court of Directors not having been obtained for the price of one pagoda, to reduce it, from the 15th January, 1798, to two rupees per pound for the best sort, and one rupee for the second sort.

In reply to the communication from Madras, an intimation of the Court's sentiments relative to the quality of the Cochineal imported by Capt. Neilson, was given under date 3rd September, 1800, similar to that made to Bengal in May, 1797.

A statement shewing the issue of the sales of the Madras Cochineal in England, in the years 1797, 1798 and 1799, was also inclosed as a number in the packet, of which the following is the substance:—

	lbs.	Sale	Amt.
In 1797 per <i>Airly Castle</i> ,	177	171	3 7
„ <i>Princess of Wales</i> ,	4,214	3,528	18 2
1798 „ <i>Marquis Lansdown</i> ,.....	11,355	3,211	4 1
„ <i>Lord Macartney</i> ,	9,865	5,391	11 0
„ <i>Lord Hawkesbury</i> ,	15,168	7,634	8 10
1799 „ <i>Dover Castle</i> ,.....	8,471	3,683	6 11

55,196 or 70 lb. 8s. 8½d.

So that the progressive deterioration in the value of Cochineal, within the first three years of its importation by the Company, was from 19s. 4d. per lb. to 8s. 8½d., the latter sum being little more than its prime cost in India.

In 1807, the management of purchases of Cochineal at Madras was transferred to the Board of Trade, who reported that, since the date of the Court's letter of September, 1800, enclosing the foregoing statement, 73,366½ lbs. of Cochineal, amounting to pagodas 40,883 : 14 : 29, had been sent to England, and that from the London Price Current, it did not appear to be an article of profit to the Company;—therefore suggesting the propriety of discontinuing the purchase, or reducing the price to two and one rupee per pound, as formerly. The Government, in reply to this date, directed purchases to continue. In this determination the Court of Directors expressed their concurrence in the following terms: “As the prices which we have obtained for the Cochineal at our sales have not been such as to reimburse the prime cost and charges, our sole reason for continuing to suffer a considerable annual loss upon this article, has been with a view to encourage the breeding of the insect, until it should become perfectly understood among the natives. It now appearing that means of collecting the insect are sufficiently established to encourage individual speculation, provided it can be undertaken with advantage, we can have no longer any reason to continue to make purchases. Nevertheless, as we have so long been in the custom of receiving the Cochineal, our suddenly withdrawing ourselves may perhaps be productive of individual inconvenience to those persons who have usually supplied us; we therefore direct that notice be published, that the quantity to be received in the year 1809 will be limited to 8,000 lbs. and the quantity for 1810, to 4,000 lbs. after which no more will be received upon our account, unless the prime cost can be reduced at least 25 per cent.”

In 1807, Mr. William Webbe, of the Madras Civil Establishment, suggested through Dr. Anderson to the Governor in Council, the expediency of advertising a reward for the introduction of the *Grana Fina*, or real Mexican Cochineal, in India. On the letters of these gentlemen being referred to the Board of Revenue for their consideration and report, that Board, after stating particularly the districts in New Spain and Peru in which the insect was usually understood to abound, the four descriptions of it known to chemists, viz. the *Mastique*, *Comeschane*, *Tetras chale*, and *Silvestre*, of which the first was considered the best, and the latter of little value, and suggesting some further hints for the preservation of it on the voyage, recommended that a reward of pagodas 5,000, or 2,000*l.* should be offered for the introduction of the insect upon British vessels only, "lest foreigners, so encouraged, should avail themselves of the opportunity of benefiting themselves by the discovery, and so diminish the value by propagating and increasing the breed of the insect."

The Court of Directors have concurred in the offer of a reward of 2,000*l.* for the *Grana Fina*, but setting aside the limitation to British vessels exclusively.

In February, 1801, the brother and executor of Captain Richard Neilson obtained from the Court of Directors a grant of 500*l.* in consequence of the very favourable notice which had been taken of his endeavours to procure the Cochineal plants and insects.

Dr. Helfer's opinion on certain Animals observed by Mr. Bell to appear on the Cacti, preceding the death of the Coccus without issue, and which seemed to have some connexion with the cause of death.

[Read 12th September, 1838.]

To J. BELL, Esq.

Secretary to the Agri-Horticultural Society, Calcutta.

MY DEAR SIR,

I have examined by means of Mr. J. W. Grant's microscope the protuberances which cover in some parts the fleshy leaves of your Cacti, upon which the *Grana Fina Cocci* imported from Bourbon feed.

They are an animal production, and are the folliculi, or outer integuments of a parasitical animal distinct from Coccus.

These folliculi (perhaps mere habitations of these parasitical animals, which were dead and dried up when I examined them), are formed of fine silky filaments closely interwoven, attached to the epidermis of the Cactus, of a circular form, rising in form of a conus, with an aperture in the most elevated part.

They are of different sizes, according, I suppose, to the development or different stages of the animal, which widens and remodels probably the integument whilst growing.

Besides this I observed smaller cylindrically shaped bodies, which I think to be the eggs of the same animal.

I dare not to decide, whether these parasitical animals feed upon the Cocci themselves, and destroy them consequently, or whether they feed upon the exudations or excrements of the Cocci, and are then harmless, or whether they exist independently from the Cocci parasites belonging to this species of Cactus*. Believe me,

My dear Sir,

Yours very faithfully,

September 10th, 1838.

J. W. HELFER.

MEMOIR,

On the means to be adopted to free the Silvestre Cochineal from the downy covering which characterises it. By M. PEROTTET, Agricultural Botanist to the French Government.

Extracted from the Maritime Annals, March and April, 1834. Translated from the French, for the Agricultural Society of India, by JOHN BELL, 1838.

NOTE,

On the Silvestre or Wild Cochineal†.

The author of the Treatise on the culture of the Nopal, and treatment of the Cochineal‡, not having shewn any means of freeing the species called *Silvestre* of the downy covering which is pecu-

* I think this last supposition to be most probable, since I have just received cases of Cacti from Bourbon without Cochineal, and on some of the healthiest lobes these parasites appear. I feared they might have been influenced by climate.—J. B.

† Read at the Agricultural Society of Bengal at its Meeting of 26th July, 1825.

‡ Thiery de Menonville's voyage to Guaxaca, 2 vols. Paris, 1787.

liar to it, consequently leaving those who might be desirous of attending to the treatment of this precious insect quite in the dark on this point, I have thought that it will not be a useless task to dissuade them from being discouraged, and from abandoning, without fair trial, a branch of industry so important to France and her colonies, to give in detail, the process I have adopted in preparing the different samples of Cochineal which I have sent to the Minister of Marine, and of which I shall successively speak in this memoir.

This process, simple as easy, cannot fail to attract the attention of the inhabitants of Senegal, and of those of other transmarine possessions where agriculture forms the principal source of wealth. The treatment of the Cochineal, directed with care, might become for both small and great landholders a new source of prosperity. It is not necessary for this kind of industry to possess, as for the culture of the sugar-cane, and a multitude of other plants, a large establishment.

A man with the least intelligence might easily, and without much trouble, cultivate and maintain at least 100 square perches* of Nopals, charged with Cochineal;—this plant requiring very little care and culture, he might be assisted at the season of gathering by children, who are generally apt at such work, agreeable as it is amusing.

In order to form a just estimate of the results of the several trials which I made to arrive at the end I proposed, I believe it will be useful to know, that the Cochineal which served for these experiments, was gathered upon the thorny *raquette* which borders the outer wall of the court of “Richard Toll,” where it was deposited on arrival from the Antilles, until the “*Opuntia inermis*,” upon which it had been attached, multiplied sufficiently.

This Cochineal had then been nine months and upwards upon the prickly plant to which it belonged, where it had already reproduced several times in great abundance, and without receiving any of that care which it required.

This circumstance rendered my experiments necessarily more difficult and tedious, and might be expected to produce a Cochineal less beautiful† than had it lived, and been collected at the proper seasons, upon the “*Opuntia inermis*,” which appears to be the species of plant generally preferred by the insect.

* A perch of 18 feet.

† “Belle” is the adjective, which comprehends so many different significations that I have adopted what appears the most correct.—TRANSLATOR.

Experience has shewn us, indeed, that the longer the Cochineal remained upon the Nopal which nourished it, the more difficult it became to disengage its covering, and that in general it was less beautiful, especially when its birth took place on those species of *Opuntia* which it did not particularly relish.

Here is, however, what I have done, and the different means I have adopted to obtain separately, the four samples of Cochineal, of which I am about to treat successively in this Memoir,—Cochineal which, as I have said, was sent to the Minister of Marine, and submitted to chemical analysis in the course of the year 1826.

FIRST EXPERIMENT.

The Cochineal of this first essay, enveloped in its cottony down, was placed in a canvas bag thin enough to admit of the fragments of its envelope passing freely through the interstices, in such manner as to be detached from its body, but not wide enough to allow the insect to escape. I then plunged this Cochineal once or twice into a basin of boiling water, which I held over the fire, to kill it : this operation lasted about four minutes ; I afterwards spread another coarse towel over a tub, about fourteen inches in diameter and about the same in depth ; I then fixed the towel to the top of the tub by means of a string all round, and laid out thereon the Cochineal ; I sprinkled it then with cold water by means of a watering pot furnished with a head perforated with holes, which I held with one hand as high as possible, and with the other hand I stirred the Cochineal to disengage and separate it speedily from its envelope.

I continued this operation for about twenty minutes, after which I took off the cloth, and turned the Cochineal it contained into a tub of cold water, to enable all that had been perfectly disengaged to sink to the bottom. I skimmed to the surface of the water, with the hand, the fragments of cotton and the numerous nests of the male insects, as also the dead and dried females, which from their lightness could not sink to the bottom of the tub. After this operation, which lasted three-quarters of an hour, I carefully drew off the water ; I received it*,

* This sentence is not clearly expressed in French ; “ it” means the water—but wherefore the necessity of receiving the water already decanted?—

as I did the Cochineal, upon the cloth which had served for my first operation, and which I had attached to a separate vessel. In this manner I obtained the Cochineal drained and in a proper state. I spread it upon a cloth, which I exposed to the sun; eight hours sufficed to deprive it of all its humidity, and even to dry it completely, so as to be available for commercial purposes immediately.

This Cochineal was sent to the Minister of Marine as No. 1, and submitted to chemical analysis, which we shall revert to at the end of this Memoir.

SECOND EXPERIMENT.

I fastened anew, round the top of the tub, the canvas of which I come now to speak. I fixed it in such manner with a string as to allow the canvas to be a little slack, and to make it take a form somewhat concave; I then spread thereon a certain quantity of Cochineal, and placed the whole under the spout of a large tub which was full of clear water.

The speedy precipitation and sudden spouting of this water upon the Cochineal produced such an effect, that a few minutes sufficed to release completely the insect from its envelope, and to leave it almost naked on the sieve. I prepared immediately another tub of clear water, into which I turned the Cochineal of this washing, in order to allow such as was quite disengaged to sink to the bottom.

I was careful during this operation to stir constantly the Cochineal with the hand, to separate that which was disposed to stick together, and to assist precipitation. I skimmed, as the insect was falling to the bottom of the vessel, all the fragments of cotton, and other foreign substances, which remained at the surface; I employed for this purpose a ladle pierced with holes, and frequently the hand only.

When all the Cochineal had collected at the bottom of the tub, I conducted with precaution the drawing off of the water which covered it, and turned the insects thus denuded upon a canvas frame. By means of some drops of boiling water which I let fall upon them one by one, I killed them all in the space of a few seconds; I then exposed them to the sun for the rest of the day. Next morning about 9 o'clock, I replaced them in the sun, and allowed them to remain until sunset. During this time I moved them about at times with the hand, in order to change the position of the insects alternately to the

influence of the sun ; in this manner they were left for the remainder of the day to dry thoroughly, and to be in a fit state for commercial purposes.

The Cochineal of this experiment was sent to the Minister of Marine as No. 2.

THIRD EXPERIMENT.

In this experiment I fixed the canvas cloth upon a tub of greater dimensions, which should serve, as before, in lieu of a sieve ; and I spread a quantity of Cochineal upon it proportioned to the extent of its surface. I took, as in the first trial, a watering pan furnished with a pierced mouth-piece, and filled this with very clear water. To give the fall of water more force, and to accelerate its precipitation on the Cochineal, I held the pan in the air with one hand, and while the water was gushing I stirred about the Cochineal with the other hand. I employed in this way four pans full of water, at the end of which the Cochineal was found to be as thoroughly stripped as could be desired.

I threw this into water, in the same manner as I had observed in the former experiments ; but I did not employ the same means to deprive it of life ; I simply exposed it to the sun on a large plate of copper, which I found by a lucky chance when prosecuting my experiments. This plate soon became so hot, that in less than three minutes all the Cochineal spread thereon was killed. The process of drying, to be sure, was a little longer ; however it did not remain more than two days and a half in the sun to require that degree of dryness which was necessary.

This Cochineal was sent to the Minister of Marine as No. 3. It is very beautiful and well prepared.

FOURTH EXPERIMENT.

The process I adopted in the last experiment differs only from the preceding, in as much as the Cochineal of this was winnowed after being washed, &c. in the water. I will not enlarge therefore on this head, beyond what relates to the winnowing. This is the way in which I performed it, and the sort of utensil I employed.

When I had disengaged the Cochineal from all its covering, and had taken it out of the tub, I took a sort of basket, in this country called *layo*, and of which the women make use so dexterously to clean the flour of millet, called *cous-cous*, which is their principal food; and I then placed a small quantity of Cochineal upon the sieve, where it was deposited in coming from the tub; then I began to winnow it. I managed this operation much after the manner practised in Europe for barley and other seeds. I agitated the basket (*layo*) actively, and tumbled from right to left, on the front part of the utensil, all the residue and fragments of cotton which remained collected after the Cochineal; that disengaged from all extraneous substance, rolled very freely upon the back part of the *layo*, which I purposely held in an inclined position, and it fell as fast as required upon the cloth I had placed on the ground to receive it.

I thus obtained a very pretty silver-like Cochineal, and clean, without employing any considerable time.

The residue and fragments of cotton which remained at the top of the *layo*, and to which some dried insects had attached themselves, were set aside with those of the preceding experiments, to be cleaned at the conclusion of my different operations.

As for the drying, the Cochineal of this fourth experiment was treated in the same manner as that of the preceding. It was exposed to the sun upon the same metal plate, and for about the same period. It is marked No. 4, of my despatch to the Minister of Marine.

When I had finished this experiment, I collected the siftings and fragments of cotton, which I now come to speak about. I washed them several times in clear water, and I winnowed them to separate the little Cochineal which had remained attached. I mustered a small quantity, which I added to the other samples—numbered 5.

This Cochineal, as might well be supposed, contained but a small proportion of colouring matter, being the produce of all the dead insects and their husks. In an establishment where the management of the *Silvestre* Cochineal might be carried on on a large scale, this refuse might be cast aside, being of little or no value. It was only for the purpose of ascertaining of what it was composed, that I took the trouble of making it into a separate sample parcel.

To form a definite judgment from the result of experiments which I am about to relate, and to prove the advantage which each process referred to presents, it will be sufficient to examine attentively the different products I have obtained, and to contrast the analysis.

It will be seen, without doubt, that the two last processes have a real advantage over the two first ; and that the fourth and last is undoubtedly the best, and of all, best calculated to disengage the Cochineal. Here, then is the manner in which I would explain the difference that exists between the Cochineal of the two first essays, and that of the two last.

We know that the first was plunged into boiling water with all its covering, and that it perished simultaneously under its stringy raiment.

To sift it so as to preserve the insect whole, it became necessary to employ various means of friction and washing, which caused a loss of part of the colouring matter, and considerably reduced its bulk.

The water in which this Cochineal was killed and afterwards washed, was so much tinted after these operations, that it must have taken from the Cochineal a considerable quantity of colouring matter ;—it thus showed the certain defect of this process, of which, notwithstanding, so much has been urged in favour.

The Cochineal of this experiment, which we have named No. 1, was much smaller, and of a less deep colour than that of No. 2, which however was not only produced in the same locality but from the same plants. This last appeared equally less coloured than that of No. 3, as this latter (No. 3) is still less so than No. 4. What then are the causes of these differences—especially between the Cochineal of these three last experiments—and to what must we attribute them? I think that I shall not be far from the truth, in attributing them to the space of time, more or less long, which the insect remained in the water, during the frequent washings to which it was subjected, and to the difficulty, more or less great, which was experienced, according to the species of plant on which it was reared, in detaching it from its envelope.

We cannot then, properly speaking, present the result of these first experiments as the certain ground-work for determining the opinion of cultivators, as to the advantages they might eventually hope for from this branch of industry. I believe that when this Cochineal shall be reduced to a regular method of treatment, and shall be raised on the Nopals which it particularly prefers—and, in fine, when the time of gathering shall be above all observed with minute attention ; I think, I say, that satisfactory results will be obtained under all circumstances.

The time of collecting the Cochineal is indeed very important, since the beauty of the insect and richness of its colour wholly depend upon this. It is at the moment when the mothers are ready to fulfil their parts* that it becomes necessary to secure the crop.

The signs by which the mothers are known to be ready for collecting, are,

1st. When they have attained their greatest size, or when they assume a form inclining to oval or elongated.

2dly. When they shed from the hind parts of the body a number of small reddish globules, containing a demi-transparent liquor, which is sometimes yellowish, sometimes reddish.

3dly. When towards the same part it throws off long whitish extremely fine filaments. These natural and limited signs ought not to escape the vigilant eye of the cultivator, who should watch with care the progress and development of the numerous swarms of insects confided to him.

The prodigious number of eggs or young Cochineal† which each mother carries, increases her weight and bulk so much, that there would be real loss in the proprietor allowing these mothers to lay their young before being gathered. It is an additional motive to those already noticed in regard to the Cochineal which is the object of our experiments.

This Cochineal, in fact, which was subjected to no regular treatment, had been gathered long after the complete accouchement of the females of which it was wholly composed. I ought probably also to attribute to the conjunction of these different circumstances the size, the length, and tenacity of the cotton with which this same Cochineal was clothed.

We are justified in thinking then, after the exposition of all these circumstances, that when the Cochineal of which we speak shall be put under careful treatment, we may obtain good produce and abundant crops; but this treatment requires some time and attention on

* To throw off their young.—ED.

† Although the Cochineal may be considered oviparous, I have never seen it bring forth eggs at once; on the contrary, I believe I have frequently seen, with the aid of a glass, the young to proceed from the mother living, and adhering to a sort of umbilical cord, to which they remain attached for four or five days before spreading over the plant which is destined to nourish them; thus they may be regarded as oviparous.

the part of the proprietor—care which afterwards should resolve itself into a simple course, to a sort of habit, which practice would soon render familiar.

Although the process of the third experiment of which I have spoken, may not be nearly so advantageous as that of the fourth, I am borne out in the belief, nevertheless, that it might be still found useful, especially if care is taken to accelerate the precipitation of the insect in the water, and to take it out immediately as soon as it is plunged. The purest Cochineal might thus be obtained, and the loss of any part of the colouring matter avoided. That which has not yet arrived at its full size, or which is smaller than ordinary, is only precipitated partially, and may not be entirely deprived of life. From this proceed two varieties of Cochineal, which might be called first and second quality.

After whatever manner the operation of disengaging the insect may be effected, it will always be necessary to winnow it after being washed and precipitated in water, because it remains constantly a little dusty, and even still engaged in some fragments of its covering. This operation is moreover both quick and easy—a few hours suffice to clean a considerable quantity.

Proposal for an Establishment to manage on an extensive scale the operation of stripping the Silvestre Cochineal.

The minor experiments I have conducted, in order to free the *Silvestre* Cochineal of the envelope which characterises it, have pointed out the necessity, that in order to conduct this operation on a large scale, we must have at disposal the means that ought to be in proportion to the extent of cultivation.

Here then is what will be useful, and the different utensils that will be required.

It would be necessary to construct in the immediate neighbourhood of the dwelling (or cultivation) a shed covered with straw or such material; within this shed a wooden or brick built basin should be fixed, of ten or twelve feet in length, by five or six feet in breadth, and about three feet in depth; and in this basin a sieve of horse-hair, or brass wire, of five or six feet in length, by three or four in breadth, and about one foot deep.

This sieve should be placed on two iron cylindrical bars fixed permanently at the ends of the basin. These should be placed about four inches distant from the inner edge of the basin, to facilitate the movement of the sieve backwards and forwards. At the two ends of this sieve, and towards the extremities, should be fixed at the height of about $3\frac{1}{2}$ inches from the bottom two strong iron rings, in which the round bars placed in the basin should slide freely, to support the sieve and assist it in going backwards and forwards. The web of the sieve should be thin enough to allow the detached envelope of the Cochineal to pass to the other side of the netting, without which precaution the insect itself would escape. Above the basin should be raised a cistern or large vessel for the purpose of repeating the operation, and to which a cock should be added;—this cistern should be kept full of water during the whole process of washing the Cochineal. The basin should also be filled before beginning the sieving process, by allowing the water to reach the sieve placed on the bars some three or four inches, and with reference to the quantity of Cochineal in it; in fine, the motion of the sieve ought to be so quick as to create a brisk and constant agitation, so as to produce upon the Cochineal the effect of regular friction. In this manner the cottony down which covers it will yield readily to the action of the water, and will disappear by fragments in proportion as the agitation is kept up.

All the cotton and foreign substances which float on the surface of the basin, and tend to incommode operations, should be removed with a ladle pierced with holes, called a skimmer; but if the whole cannot be entirely separated, the cock at the bottom of the basin should be turned to let off all the refuse, and the basin should be thoroughly cleansed. This cock should be re-turned, and that of the cistern above opened. The water which falls through this cock directed on the Cochineal contained in the sieve will suffice to finish the washing process, and to free the Cochineal from the remainder of its covering.

The Cochineal thus denuded, should be taken out from the sieve immediately after the operation. It should be brought into one of the corners of the sieve by the aid of a soft brush, and taken out with the hand; it should then be placed gradually upon a canvas frame, where it will drain and dry quickly. A small tin or willow cribble should be had, in form and size like that used by florists and corn-dealers, with this difference, that this which I suggest should be open towards

the lower part of the back. This opening should be made transversely, and about six lines from the bottom not exceeding half an inch in width.

There should be a bar to prevent the Cochineal from passing, which, as I have said before, rolls to the back of the cribble and falls to the ground; or it would be better to have a cloth in which to receive it. I have explained sufficiently in detail the process of washing, in speaking of the experiments that form the basis of this Treatise, I will content myself therefore by referring my readers to them*.

Now it will not answer to kill the Cochineal with boiling water, since experience has shewn this to be a bad method. It should be simply exposed to the sun, or what is still better, in an oven heated sufficiently, but not too much; or it may be spread on any metal plates that have raised borders. The heat which these plates imbibe, suffices to kill the insect almost immediately, and to deprive it of all its moisture;—one or two days of exposure to the sun, or some hours in the oven, which is much better, would be ample to secure the drying, and to put it into a merchantable condition at once.

It would be far better, I repeat, to place it in an oven heated to a convenient temperature; the insect would thus be killed and dried speedily, without causing that alteration which the action of the sun necessarily produces on it.

It was by the heat of the sun that I prepared the Cochineal of my two last experiments, which has been considered by chemists who have analyzed it, as being of a good quality, although susceptible of amelioration.

This amelioration might be brought about by care in rearing the Cochineal, and in the means taken to kill and dry it. For these two last means the oven ought assuredly to be preferred to all others.

It is easy to see, after what has been said, of what importance it will be for the French Colonies, especially for Senegal, the acquisition of a branch of industry so valuable and lucrative.

The Nopal which nourishes the insect thrives as well as where I have seen it growing spontaneously; but it is necessary to keep in mind, that it has been introduced very recently, and that the rearing of the Cochineal cannot be carried on to a very great extent, and with marked success, until it shall have multiplied considerably.

* NOTE.—It is a very difficult matter to convey the exact meaning of the writer in a translation, when the subject is to explain any particular form or mechanism.—TRANSLATOR.

The insect multiplies moreover in Senegal in a truly remarkable manner. I do not believe there is a country in which its reproduction takes place with so much facility*. The means to be adopted for its treatment, as we have seen, are as simple as easy, consequently very trifling in cost. I do not then see any thing to prevent us from giving our serious attention to this interesting branch of industry in the French transmarine possessions.

I am wont to believe that the planters of Senegal, for whom this Essay is especially written, will soon acknowledge the accuracy of the facts which I have related. The soil and climate they inhabit appear generally better adapted to the Nopal, and to the Cochineal which are nourished by them, than to many other exotic vegetables of which the organization appears less susceptible of ability to resist the frequent atmospheric variations, as well as to their mischievous influence. It is however an incontestable fact, which the sagacity of the inhabitants cannot make me disbelieve.

It has been thought until now, but erroneously, that the stringy covering of the *Silvestre* Cochineal was an obstacle which necessarily ought to make us reject its amelioration. Experience has shewn us, on the contrary, that this envelope is a fit argument why we should not neglect it, and that it is necessary, and even indispensable, for its preservation. In fact I have observed that ants of all kinds are great enemies to the Cochineal, and that they devour it as soon as they catch hold of it—birds, spiders of different kinds, as also many other destructive insects eat it up with incredible rapidity when they find it deprived of its covering; but they never attack it when it is clothed. This strong substance, which has some analogy to the spider's web, is a certain snare for the ants, which catches them by the feet with great ease, and makes them the prey of numerous spiders that have their webs every where.

It is particularly by the operation of gathering the Cochineal, of which I have spoken in this Memoir, that I am assured of the singular allurements which this valuable insect holds out to ants and spiders. As soon as one fell to the ground it was found covered with thousands of ants, that seemed to watch the moment of its fall. It was not without trouble that I succeeded in preserving the Cochineal of my experiments from their voracity; I was obliged in order to dry it, to place it upon scaffolding, and to cover each prop with long stapled cotton. This method succeeded completely.

* I should say that in Bengal it multiplies too fast.—TRANSLATOR.

It will be seen, after this statement, how difficult the treatment of the *Mesteque* Cochineal, which has no covering, becomes, and how great the chances of failure are. The atmospheric variations are equally fatal to it; a heavy rain, the wind from every quarter, causes it to fall with incredible facility, and occasions infallible loss. The *Silvestre* Cochineal, on the contrary, resists all the inclemency of seasons;—continued storms and rain can only make some fall.

It is true that this Cochineal is a little smaller than the *Mesteque*, and that it is clothed with a silken coat which it is necessary to remove; but, on the other hand, it is more hardy, and its colour is of a red perhaps more intense.

If it were known in commerce, prepared as I recommend, no doubt it would be, if not preferred to the *Mesteque*, at least as much sought after. I entreat cultivators then not to be disheartened by the apparent inconvenience which the envelope it possesses presents, and to apply themselves with more confidence to its culture, since there is a simple process, easy, and at trifling cost, by which it may be quickly disengaged.

Such are the results I have obtained, from various trials to which I have given my attention, up to this time; and the observations I have to offer on the means to be adopted to free the *Silvestre* Cochineal from the cottony covering which characterises it. I believe them sufficiently satisfactory to engage the colonists of Senegal and those of other French Colonies to apply themselves more particularly to this interesting branch of industry, which may become a source of riches, and of certain prosperity.

(Signed) PEROTTET.

Saint Louis, Senegal, 15th July, 1825.

Report by the Professors of Culture and Chemistry to the Meeting of Professors of the Museum.

His Excellency the Secretary of State in the Department of Marine of the Colonies, sent to Government on the 19th October last, samples of Cochineal, the produce of Senegal, and chemical analysis was ordered to be made, with a view to see what benefit the Colony would derive from this article. His Excellency has been answered that means will be adopted to reply to his inquiries.

*Examination of five samples of Cochineal prepared at Senegal,
by M. Perottet.*

Of five samples of Cochineal, Nos. 1, 2, 3, 4 and 5, sent by M. Perottet, only the four first have been prepared by particular means :—the two first samples were submitted to boiling water ; the others to cold water and exposure to the sun. As to sample No. 5, it is made up of the siftings or refuse of the Cochineal prepared according to the fourth process ; these siftings having been submitted to the same treatment as sample No. 4. After the experiments which we have made on the infusions of the four first samples, we are convinced that Nos. 1 and 2 are inferior to No. 3, although the difference is not great ; it is moreover what M. Perottet suspected. We think with him then that the process No. 4 ought to be practised in preference to the others.

The samples Nos. 1 and 2 contain less colour than Nos. 3 and 4, and the red colour there is accompanied with a greater proportion of yellow and brown than in the last.

We would advise M. Perottet to try if it will be more advantageous to expose the Cochineal to an obscure heat in an oven, instead of exposing it to the sun. In both ways the insect is killed and dried at the same time, but in the former the action of the light is avoided.

We then endeavoured to establish the affinity between the colour of the Cochineal No. 4 and that of the first quality in commerce. To this end, we submitted, 1st, two skeins of wool perfectly alike, to the process followed to dye the wool a clear crimson ; 2nd, two skeins of wool perfectly alike, to the process followed to dye the wool a clear scarlet.

In each of the four trials we employed one-fifth of Cochineal of the weight of the wool ; but the dye of each skein was made twice.

The first time it was subjected to boiling five minutes, in employing one-tenth of Cochineal, and in the second, it was made to boil five minutes, by adding to the bath a tenth of Cochineal.

Here are the results of these experiments :—

First.—Wool dyed a clear crimson.

A—After the first time, the wool dyed with the Cochineal No. 4, was of a colour less than half the wool dyed with the Cochineal of commerce.

B—After the second time, the difference was less but still it was apparent; and it was remarked after the operation, that the bath of the Cochineal No. 4 was much less charged with colour than the second.

Second.—Wool dyed a clear scarlet.

C—After the first time, the wool dyed with the Cochineal No. 4 was of a rose, lighter, and less yellow than the wool dyed with the Cochineal of commerce; but the difference was less than remarked in A.

D—After the second time the wool dyed with the Cochineal No. 4 was of a scarlet less beautiful and less lively than the wool dyed with the Cochineal of commerce. After the operation the bath of the Cochineal No. 4 was yellow, while the other was of a red scarlet.

Conclusion.

It is evident that the Cochineal of Senegal contains less red colour than the Cochineal of commerce of good quality.

We think that in representing by 2 the quantity of this colour in the first Cochineal, the quantity of red colour in the Cochineal of commerce will be represented by 3.

We will add, that there is less proportion of the yellow and brown colouring principles in the Cochineal of Senegal than in the Cochineal of commerce. Although this may be the case, the culture of the Cochineal of Senegal may present advantages, especially if all the care is taken that is recommended by M. Perottet.

We should have wished to compare the *Silvestre* Cochineal of Senegal with the Cochineal prepared by the process No. 4, with a view to rate the advantage of this process, exactly; it has been impossible to do this, M. Perottet not having added to his despatch any Cochineal in its natural state.

(Signed) VAUQUELIN & BOSCH.

Paris, January, 1826.

N. B.—I will soon explain in a detailed work, which I have been engaged upon for some time, on the Culture of the Cochineal *Opuntias*, and the Treatment of the Insect which is nourished by them, the different species of Nopals on which it attaches—more particularly each of the Cochineal which are indicated by the name of *Mesteque* and *Silvestre*.

I will content myself by remarking here, that the *Silvestre* Cochineal becomes finer, larger, clothes itself with an envelope less thick, and above all less tenacious on the *raquette* (the India fig of the coast of St. Domingo) or the *Opuntia tuna* of botanists, than upon the *Opuntia inermis* of M. Decondolle, or Spanish *raquette* of Thiery de Menonville.

But the first of these *Opuntias* presents serious inconvenience—that of being covered with long, hard and pointed thorns which do not admit of touching it without cruelly wounding the hand. The second is entirely deprived of these organs; but it is provided with sharp silky bristles, re-united in numerous clusters, which are exceedingly troublesome, because they insinuate themselves into the skin with great ease, and cause a very painful burning.

It was upon these two species of *Opuntia*, and especially on the last, that we tried the rearing of the *Silvestre* Cochineal in Senegal; which increased so much that the branches became quite white at the end of a few months, and bent by degrees under the weight of these numerous parasites. The insect remained there continually small and covered with a thick down extremely tenacious.

We received from Cadiz, at two different times, the Cochineal *Mesteque* on the true Nopal of Castille, a plant very much extolled by Thiery de Menonville, and considered by him as the best for the rearing of this species of insect. I regard this Nopal as a very remarkable variety of the *Opuntia Hernandezü* of M. de Decondolle, or at most as a species extremely near akin. I will therefore call it, and waiting until its fruiting shall be known, under the name of "*Opuntia Hernandezü V. Castellana*," a name which might induce botanists to apply their attention to a plant which is only, as seems to me, imperfectly known*. That of the gardens of Mexico,

* I have just read, in the Botanical Magazine of M. Hooker, some interesting details on the Cactus *Cochinellifer*, when the author shews, by the aid of a plate, that the Cactus *Cochinellifer* of Linnæus is the true Nopal of Castille. If it be so, it must be conceded that botanists are strangely mistaken concerning this plant, since they have described it until now as covered with thorns, while it is entirely free from them. This plant as we shall hereafter see, only nourishes the "*Cochineal Mesteque*," which has not as yet been noticed by any author. It is undoubtedly this omission which gives rise to the difficulty of recognizing this Nopal; so I will confirm the opinion of M. Hooker, by saying, that the Nopal of Castille is the *Opuntia Cochinelifera* of Miller. Dic. Ed. in 8vo. No. 6.

alluded to by Thiery de Menonville as being as fit for the nourishment of the fine Cochineal, and of which this author has presented a plate with a male of the *Silvestre* Cochineal on it at the end of his treatise, is without doubt the *Opuntia Hernandezii*, described and drawn in the review of the family of Cacti of M. de Decondolle. Thiery de Menonville asserts, that the fine and wild Cochineal attach themselves equally well upon these two plants. I strongly believe that he is mistaken, and that he has confounded these Nopals with others assuredly very different; for I have always remarked that the *Silvestre* Cochineal never adhered to the Castilian Nopal*, which, as I first said, appeared scarcely different from the *Opuntia Hernandezii*. Some lobes of Castilian Nopal planted very near to the *Opuntia inermis* covered with *Silvestre* Cochineal, have always remained bare and very green in the midst of this multitude of insects. I had already remarked this in the Antilles, when I was sent in search of the Nopals, and the wild insect, which I conveyed thence to Senegal, when I was deputed to naturalize it.

Some fine lobes of the Castilian Nopal, reared in the midst of a plantation of Spanish *raquettes* whitened with the *Silvestre* Cochineal, were found of a deep and brilliant green, and entirely deprived of this Cochineal.

The fine Cochineal does not attach itself either to the *Opuntia inermis* of M. de Decondolle, or the Spanish *raquette* of Thiery de Menonville.

The attempts that I have made at different intervals to endeavour to establish it upon them, have always proved ineffectual. Thiery de Menonville nevertheless says that it can live upon them, but that it cannot attain maturity, and that it ends in dying shortly after its being fixed.

* My experience confirms M. Perottet's assertion. I have tried ineffectually to attach the *Silvestre* to the Castilian Nopal received from Bourbon. At this moment, I have a plant confined in a basket well charged with the mother insect. As the young are shed, they run over the leaf, and appear to attach themselves, but gradually die without any enlargement; whereas in the same basket I have added a leaf of the Cochinellifer to which they more greedily adhere, and speedily become covered with silky down. This is a clear proof that the Castilian Nopal from Bourbon, and the Cochinellifer are essentially different, although they have been thought to be here the same, by an eminent botanist.

—Translator of Perottet's Memoir on the *Silvestre*.

THE SILVESTRE COCHINEAL ABOUNDING IN THE
DISTRICT OF MIDNAPORE.

*Extract of a Letter from JOHN GUILDING, Esq. to Mr. BELL,
dated Calcutta, 23rd May, 1838.*

[Read 13th June, 1838.]

“ I likewise send the sample of Cochineal made by me*, in Midnapore, on which I shall feel much obliged by your obtaining the opinion of Dr. O’Shaughnessy ; it is in its present state a rough manufacture, but can be greatly improved if we could ascertain its probable value in the English market.”

*Professor O’SHAUGHNESSY’S opinion of Mr. GUILDING’S sample
of Cochineal Paste.*

[Read 13th June, 1838.]

MY DEAR BELL,

I have examined Mr. Guilding’s Cochineal paste. Although slightly altered by commencing decomposition, it is nevertheless a very valuable and beautiful article. It affords the colouring principle of the Cochineal in great purity, and with the suitable oxides gives rich and brilliant lakes. I can find no difference whatever between this paste and a watery extract of the best foreign Cochineal prepared by myself, and with the utmost care.

This I think completes the proof that between the *Fina* and *Silvestre* insects there exists at least no chemical difference. The quantity of blood (or proportion of colouring matter, if you prefer the expression), may be greater in the former, but I entertain no doubt that care in rearing, and the provision of suitable food, would produce on the wild kind the same improvement in size and quantity of blood that domestication effects in all other animals.

It would be interesting to know from what quantity (by weight) of insects Mr. Guilding procured the quantity of paste with which I was favoured. On this of course rests the importance of the experiment in an economical or commercial light.

* The Cochineal sent by Mr. Guilding was of the consistence of paste, and was the pure blood of the insect only, obtained by pressure and partially submitted to solar evaporation.

At all events, when we consider the ease with which the insect reaches its *present* state, the number of crops which may be gathered in each year, the cheapness of the labour necessary for the collection—and when we reflect that the dye obtained is in quality at least equal to that of the best South American article, I think the Society should lend its warm aid to the introduction of this cultivation. The produce obtained by Mr. Guilding's method would be preferred by the dyers in Europe to the best *lac dye*. Were it only to equal the *lac* colour it would still be worthy of our utmost attention, in as much as the Cochineal insect can be produced to any extent in innumerable localities, while we depend for *lac* on the jungle alone.

Believe me, dear Bell,

Yours sincerely,

W. B. O'SHAUGHNESSY.

Medical College, Calcutta, 31st May, 1838.

MR. PIDDINGTON'S OPINION ON CAKE COCHINEAL.

A Letter on Cake Cochineal prepared from the Silvestre, or Wild Cochineal of India, by H. PIDDINGTON, Esq.

[Presented to the Agricultural Society of India. Read 13th June, 1838.]

MY DEAR SIR,

Your samples of Cochineal are much like some which I myself prepared two or three years ago. From some careful experiments my conclusions are as follow :

1. The Indian Cochineal contains besides its red colour a peculiar blackish colouring matter, (or this forms rapidly during the process of preparing it?) this is soluble in hot water with the red matter, and it is I suspect what renders East Indian Cochineal objectionable; the downy matter too, which seems partially soluble under some circumstances, may be found to affect the dyer's vats; there is moreover a greater proportion of animal matter in an equal weight of it than in South American Cochineal.

2. It becomes then our business to free it as far as possible from these matters, and this I observe your friend has tried, as I did, by extracting the colour, and evaporating it to a cake. In this state, *if it could be preserved*, it would certainly rival the South American, for it then contains greater proportion of colour.

3. And this colour seems equally pure, for I find the precipitate by Muriate of Tin was as bright a scarlet as that obtained from the best South American Cochineal.

4. But there is a difficulty in keeping it in this state. After a few months, and particularly in rainy weather, it absorbs moisture, emits an unpleasant smell, and loses its perfect brightness of colour, for it will not then produce a brilliant scarlet, (does this change also take place in the insect when dried and sent home? it seems probable that it does,) this would render it a matter of difficulty to send it home. Mine has been kept in a closely stopped bottle, and is now fully three years old; I send you a sample of it.

5. Your friend then will have to make some trials to overcome this; perhaps mixing a cheap alkali, such as lime, might render it able to stand the voyage—the colour will then become purple, but the dyers would easily remove the lime; or alum in powder might preserve the cakes of dye, or charcoal might prevent the fermentation. In short, he must try all things; and I think it would be far better if something in which to pack the cakes, like alum or charcoal, could be found; the dyers dislike mixtures with delicate colours.

6. It should be sent home to some dyer, with an assurance that a quantity could be supplied; for they will not bestow much attention on an article of which they cannot obtain a supply.

7. I discontinued my experiments from the difficulty of finding any supply of the insect, and finding they destroyed all the young plants of the Cactus which I had. I presume your friend resides where there is an abundance of it.

8. Copper vessels are I think preferable for all the processes; if your friend meddles with chemistry he will be aware of the chances he runs of hurting his colour by the use of any iron utensils.

9. The tendency of the cake to absorb water may be the proximate cause of its fermentation; and this may be owing to the presence of a deliquescent salt, (one of my notes suggests that it is muriate of potash;) supposing this, it may be got rid of by washing the powdered cake, after perfectly drying it, in spirit of wine, which is cheap enough, and would serve over and over a hundred times; the colour is quite insoluble in alcohol. This path is one which should certainly be tried on a small scale.

Yours very truly,

H. PIDDINGTON.

N. Tollah Coffee Plantation, February 1, 1831.

EXHIBITION OF INDIGENOUS VEGETABLES,

AND A FEW VARIETIES OF FRUITS;

Held at the Town Hall, on the 15th August, 1837.

MEMBERS PRESENT.

His Excellency Mons. **BEDIER**, Governor of Chandernagore.

Dr. WALLICH.
NAWAUB TOHOWERJUNG.
Col. CAULFIELD.
Messrs. R. WATSON,
W. STORM,
J. W. MASTERS,
W. CRACROFT.

Messrs. JOHN JENKINS,
H. WALTERS,
N. ALEXANDER,
D. MCFARLAN,
T. H. GARDINER,
 and
JOHN BELL.

JUDGES.

Dr. WALLICH and Mr. CRACROFT.

Description of Vegetables, &c.	Names of Mallees.	Place of Cultivation.	Rewards.	
			Rs.	As.
Asparagus, ...	Hauroo,	Sonae,	2	0
Ditto, ...	Rannarain,	Mootee Jeel,	1	0
Ditto, ...	Enaamdee,	Moocheekollah,	1	0
Ditto, ...	Hullodhur,	Ditto,	1	0
Ditto, ...	Muddoo,	Mootee Jeel,	1	0
Almonds, (Country.)	Moocheeram,	Moocheekollah,	0	8
Avagado Pear, ...	Muttoor,	Ditto,	2	0
Ditto, ...	Maudhoo Ghose,	Singar-hât,	2	0
Beans, ...	Jaudhub Ghose,	Ditto,	2	0
Ditto, ...	Bozahurry,	Moocheekollah,	2	0
Ditto, ...	Bissoo Paul,	Ditto,	1	0
Beet, (Red and White,)	Sumboochund,	Sonae,	2	0
Brinjals, ...	Lallchaund,	Singar-hât,	1	0
Ditto, ...	Sadooram Ghose,	Moocheekollah,	1	0
Bansputtie & Sootie,	Goluck Mundle,	Singar-hât,	1	0
Dheraus, ...	Nubbokistoe Doss,	Moocheekollah,	2	0
Cucumbers	Hauboo,	Singar-hât,	2	0
Cuddoo, (long,)	Hauroo,	} Sonae, {	1	0
Ditto, (short,)	Ditto,		1	0
Cutchoo, ...	Premnarain,	Moocheekollah,	1	0
Capsicum, (Nepal,)	} Bissonaut Ghose,	Ditto,	2	0
Ditto, (Bengal,)...				
Cheecheengee,	Jharoo Mundle,	Singar-hât,	1	0
Ditto, ...	Roheem,	Moocheekollah,	1	0
Cherree Mella,	Sheloo,	Singar-hât,	1	0
Chillies, (mirich dhan,)	Hauroo,	Sonae,	1	0
Carrots, ...	Mundoo Mundle,	Moocheekollah,	1	0
Cabbage Sprouts, ...	Mudden Paul,	Jharoola,	2	0

Description of Vegetables, &c.	Names of Mallees.	Place of Cultivation.	Rewards.	
			Rs.	As.
Cauliflower Plants,	Nundoo Ghose,	Moocheekollah,	1	0
Citron,	... Rutton Ghose,	Ditto,	1	0
Custard Apple,	... Poran,	Ditto,	1	0
Figs,	... Unknown,	Unknown	0	8
Ginger,	... Hyder,	Moocheekollah,	1	0
Gerkins,	... Nawaubdee,	Ditto,	1	0
Indian Corn, (Country,) ... } Do. (American,) ... }	Seebooram Ghose,	Ditto,	2	0
Kuzella,	... Bozahurry,	Sonae,	1	0
Koomra,	... Nubhokisto,	Moocheekollah,	2	0
Leeks,	... Ramnauth,	Ditto,	1	0
Limes,	... Azoomuddee,	Moldangee,	2	0
Mangoe,	... Goroochurn,	Moocheekollah,	1	0
Omrah,	... Sumboo,	Singar-hât,	1	0
Oal,	... Seedoo,	Moocheekollah,	1	0
Onions,	... Mudden,	Kidderpore,	1	0
Otaheite Apple,	... Kurreem,	Singar-hât,	2	0
Pulwul,	... Sardoo,	Jharoola,	1	0
Ditto,	... Seeboo,	Moocheekollah,	1	0
Parsley, (English.)	... Roopchund,	Ditto,	2	0
Do. (Country,) ...	... Narrain Ghose,	Singar-hât,	2	0
Pine Apple,	... Bissonaut,	Moocheekollah,	1	0
Ditto,	... Dabee,	Ramchundpore,	1	0
Radish,	... Haroo Doss,	Singar-hât,	2	0
Do. Horse,	... Unknown,	Unknown,	1	0
Sugar Cane, (Mauro-ritius,) ...	... Kosal Mallee,	Moocheekollah,	4	0
Spinnage,	... Kanae,	Sonae,	1	0
Salad, ... } Ditto, ... }	Hauroo Doss,	Moocheekollah,	4	0
Saug, Chownlie,	... Moneeruddee,	Ditto,	1	0
Ditto, Loll,	... Bissonaut,	Singar-hât,	1	0
Ditto, Sooa,	... Jameerut,	Sonae,	1	0
Ditto, Pocee,	... Kalleechund,	Moocheekollah,	1	0
Ditto, Methee,	... Kosaul,	Ditto,	1	0
Ditto, Pat,	... Kalleechund,	Ditto,	1	0
Turnips,	... Emaumdee,	Ditto,	2	0
Turmeric,	... Sardoo,	Jharoola,	1	0
Tomato,	... Hurriss,	Moocheekollah,	1	0
Ditto,	... Ramcomul,	Singar-hât,	1	0
Ditto,	... Gooroopersaud,	Moocheekollah,	1	0
Tarai,	... Ramchunder Paul,	Ditto,	1	0
Tal, (Fruit,) ...	... Gooroochurn Doss,	Ditto,	0	8
Yam, (Batavian,) ...	... Kurreem,	Sonae,	1	0

90 8

Distributed to unsuccessful Candidates,..

29

Total, Rs.. 120

Exhibition of Vegetables, held at the Town Hall, on the 29th of January, 1838.

JUDGES.

Dr. WALLICH, Messrs. W. STORM and W. F. GIBBON, and Dewan RAMCOMUL SEN.

MEMBERS PRESENT,

As far as could be ascertained.

The Hon. Sir E. RYAN.
 The Hon. Sir J. P. GRANT.
 Dr. WALLICH.
 Messrs. W. STORM,
 W. F. GIBBON,
 A. BEATTIE.
 Dewan RAMCOMUL SEN.
 Drs. W. G. MAXWELL,
 A. R. JACKSON,
 HUFFNAGLE.
 Messrs. C. R. PRINSEP,
 SAMUEL SMITH,
 J. H. STOCQUELER,
 D. HARE,
 C. HUTCHINS,
 R. WATSON,
 The Rev. T. BOAZ.

Messrs. H. WALTERS,
 W. CRACROFT,
 W. AINSLIE,
 A. COLVIN,
 JAMES COLQUHOUN,
 H. M. PARKER,
 N. ALEXANDER,
 C. TREBECK.
 Dr. STRONG.
 Messrs. T. H. GARDINER,
 ARCHD. GRANT,
 A. DOBBS,
 THOMAS LEACH,
 JAMES COOK,
 D. W. H. SPEED,
 and
 JOHN BELL.

Register No.	Names of Mallees.	Situation of Garden.	Sample.	Medals awarded.	Donations.
A.—CAULIFLOWERS.					Rs. As.
66	Beenud Mallee, ...	Jharoola,	Best,	1	8 0
13	Rannarain Doss,	Moocheekollah,	2nd do.	...	5 0
36	Kadir, ...	Ditto,	3rd do.	...	3 0
B.—PEAS.					
Not Regd.	Nocheem,	Baltagree,	Best,	1	8 0
171	Nusseem,	Ditto,	2nd do.	...	5 0
24	Muddoo,	Saum Bazar,	3rd do.	...	3 0
C.—LETTUCE.					
Not Regd.	Puddoo Sircar,	Porooee,	Best,	1	8 0
Ditto,	Unknown,	Unknown,	2nd do.	...	5 0
Ditto,	Ditto,	Ditto,	3rd do.	...	3 0

Register No.	Names of Mallees.	Situation of Garden.	Sample.	Medals awarded.	Donations.
	D.—CELFRY.				Rs. As.
121	Comul, ...	Saum Bazar,	Best,	1	8 0
82	Tarrachund, ...	Ditto,	2nd do.	...	5 0
1	Hullothur Doss,	Moocheekollah,	3rd do.	...	3 0
	E.—CABBAGE.				
34	Jandhub Ghose, ...	Moocheekollah,	Best,	1	8 0
28	Nubbokisto Doss,	Sonae,	2nd do.	...	5 0
70	Kosal Mallee, ...	Kidderpore,	3rd do.	...	3 0
	F.—RED CABBAGE.				
3	Cheroo Ghose, ...	Moocheekollah,	Best,	1	...
	G.—SAVOY CABBAGE.				
Not Regd.	Bissonaut Doss, ...	Baelah,	Best,	1	3 0
	H.—TURNIPS.				
59	Emaumdee, ...	Moocheekollah,	Best,	1	8 0
143	Goojaram Santra,	Mooteejeel,	2nd do.	...	5 0
5	Muttoor Ghose, ...	Moocheekollah,	3rd do.	..	3 0
	I.—KNOLCOLE.				
8	Seehnarain Doss,	Sapoor, Baelah,	Best,	1	8 0
106	Dwarkanaut Doss,	Moocheekollah,	2nd do.	...	5 0
4	Rannaram Ghose,	Ditto,	3rd do.	...	3 0
	K.—CARROTS.				
Not Regd.	Dareeganaut, ...	Moocheekollah,	Best,	1	8 0
51	Haubboo, ...	Ditto,	2nd do.	...	5 0
18	Ranjeebun Doss,	Ecal Ghaut,	3rd do.	...	3 0
	L.—ARTICHOKE.				
2	Premchaund Doss,	Moocheekollah,	Best,	1	5 0
	M.—JERUSALEM ARTICHOKE.				
56	Mooktaram Ghose,	Modoor.	Best,	0	8 0
	N.—FRENCH BEANS.				
65	Bissonaut Ghose,	Moocheekollah,	Best,	0	3 0

Register No.	Names of Mallees.	Situation of Garden.	Sample.	Medals awarded.	Donations.
O.—WINDSOR BEANS.					
Not Regd. 116	Hurry, ... Buddenaut Doss,	Meetapooker, Étal Ghaut,	Best, 2nd do.	1 ...	5 0 5 0
P.—RED BEET.					
46	Mutteewoollah Kazeer, ...	Singar-hât,	Best,	...	3 0
Q.—LEEKS.					
45	Roopchund dle, ...	Singar-hât,	Best,	...	8 0
R.—ONIONS.					
Not Regd.	Unknown, ...	Unknown,	Best,	...	5 0
S.—TOMATO.					
86	Kisto Doss, ...	Saum Bazar,	Best,	...	4 0
T.—PEPPER.					
Not Regd.	Name unknown,	Grown near Barripoor, by Mr. R. S. Hom- fray's Mallee,	Best,	...	3 0
In addition to the above, Mrs. Pennington distributed in smaller prizes,.....					15 0
Total,...				12	195 0

REMARKS.

The show of Vegetables was far beyond any thing that could have been expected, with reference to the unusually unfavorable season. The Cauliflowers, Cabbage and Peas were particularly excellent;—Carrots from Cape seed, were superior to preceding years;—of Cape Broad Beans there were two fine baskets;—Onions and Leeks though few, were large and good;—and the Red Beet and Salad in good season; only two baskets of Artichokes were visible. Potatoes very few. The Celery though good, was not sufficiently blanched.

TRANSACTIONS

OF THE

AGRICULTURAL AND HORTICULTURAL SOCIETY OF INDIA.

I.—*Sugar-cane Cultivation in the district of Azimghur.*

Statement of the quantity of land in the district of Azimghur, under Sugar-cane culture, and other interesting details.—Communicated by R. MONTGOMERY, Esq. C. S. Secretary, Branch Society of Azimghur, in a letter to the Secretary, dated 27th Sept. 1837, accompanied by a map.

[Read December 13, 1837.]

I have much pleasure in forwarding a map of this district, and answers to the queries circulated by the Members of the Agricultural Society, drawn out by Mr. Tucker and myself from the official records of this district. The recent detailed professional survey for the purpose of settlement has afforded us the means of giving accurate returns of the total area cultivated, culturable, and barren waste land, whilst the settlement now concluded has enabled us to fill up the other columns relating to the revenue of the district. The estimate of the quantity of cloth, silk and tussur manufactured has been obtained from returns of looms at work. The opium is the average of the actual produce for the last three years, and the indigo is pretty nearly the truth. The land under sugar cultivation was, as I before said, chiefly

taken from an actual measurement of the quantity in each village. The population return has been estimated at three souls to each male adult, a nearly similar result may be obtained from the census of houses allowing six individuals to each house, but I am inclined to think that the census here given is above the mark.

The map was drawn by Mr. Tucker, and will, I have no doubt, be useful for the purpose of reference. The crops are very equally apportioned throughout the different pergunnahs, perhaps rice is more generally cultivated in the southern parts; but this crop is very inconsiderable, the Sugar cultivation being the one that is most attended to, and which is cultivated with the greatest care, as upon its produce the cultivators most rely for the means of paying the Government demand.

Resources of the District of Axinghur referred to in Mr. Montgomery's communication.

Number of Villages in each Pergunnah.	Malgozarate.		Minhae.		Total Area in Acres.	Government Jummah in Co.'s Rupees.	Average Assessment on total Area per Acre.	Average Assessment on total Malgozarate Area per Acre.	Average Assessment on Land actually under Cultivation per Acre.	Land in Acres.	Number of Pieces of Cotton Cloth manufactured annually.	Number of Pieces of Silk cloth annually.	Number of Pieces of Tussur annually.	Opium and Indigo.	Number of Houses.	Number of Male Adults.	Estimated Population.
	Cultivated Acres.	Uncultivated Acres.	Lakhi rai.	Barren.													
1,133	117,831	41,052	5,780	1,12,054	2,76,716	3,04,069	1 7 14 11	2 9 8	11,978	60,285	..	..	628	28,721	66,639	1,99,917
519	73,213	49,661	6,685	37,324	1,65,853	1,66,212	0 1 5 8	2 4 4	7,392	21,828	..	..	..	17,963	38,604	1,15,818
671	60,432	23,107	4,257	56,871	1,46,667	1,27,493	0 13 11 8	2 1 9	5,650	4,556	..	..	..	15,695	34,879	1,04,637
450	53,942	8,394	2,624	58,592	1,23,565	1,17,261	0 15 23 14	2 2 6	3,016	44,292	..	..	..	11,870	31,539	94,617
744	75,930	12,984	4,149	1,02,390	1,36,453	1,71,800	0 14 2 15 3	2 3 9	9,926	3,56,284	6,768	2,34,576	23,843	47,269	1,41,907		
64	4,661	3,898	325	5,530	14,304	11,727	0 13 1 7 2	2 8 0	486	Included in Mohammudabad.	..	..	28,082	2,328	4,875	14,945
360	40,835	22,641	2,975	7,985	74,436	81,471	1 6 4 6	1 15 11	6,438	61,812	..	..	6,095	19,130	57,370	
145	19,631	12,699	1,382	4,910	38,622	37,919	0 15 8 1	2 9 16	1,230	5,208	..	..	2,544	3,152	9,894	29,698
174	16,016	7,385	1,259	6,810	30,470	27,550	0 15 5 1	3 6 13	4,164	3,096	..	..	18,720	2,922	7,916	23,748
326	37,481	10,276	1,121	26,769	75,647	68,720	0 12 5 1	3 8 1 9	0 1,360	14,208	..	..	4,527	30,778	69,834	
375	43,609	21,418	1,602	38,565	1,05,194	94,074	0 14 34 1	2 2 2 6	3,215	40,620	..	..	3,168	8,529	40,577	1,21,731
282	21,096	10,047	2,069	12,659	45,921	43,604	0 5 2 1	6 5 2 1	2,394	18,564	..	..	3,104	3,266	14,519	43,957
66	6,050	2,656	422	5,672	14,800	14,288	0 15 6 1	10 3 5 7	914	1,744	..	..	..	694	1,378	4,134
163	18,511	8,535	1,471	10,312	38,829	39,937	0 11 5 1	7 2 2 6	1,956	5,616	..	..	..	1,156	2,689	8,055
600	144,200	16,972	4,322	54,409	2,19,903	1,56,673	0 11 5 0 15 6	11 4 1 4 1	15,217	..	..	..	..	27,465	66,418	1,99,254
125	17,347	4,260	790	9,520	31,917	25,507	0 12 11 1	2 11 1 7 6	..	..	..	..	..	..	..	..
Totals..					40,150	5,62,402	1,588,329	1472,305	20 14 11 1	7 6 1 9	14,76,636	6,37,496	6,768	2,18,772	1,65,931	4,06,100	1,218,300

N. B.—The Population averages 196.59 souls to each village and 467.8 to the square mile on a surface of 497.3 square miles.

II.—*Sugar-cane Cultivation in the districts of Mirzapore, Benares, Juanpore and Western Ghazepore.*

Remarks on the cultivation and manufacture of Sugar-cane, from a memorandum taken in 1835-36, in the districts of Mirzapore, Benares, Juanpore, and Western Ghazepore.

By JOHN H. HAINES, Esq.

: [Read 14th February, 1838.]

The lands for the cultivation of Sugar-cane are generally selected after the Rubbee crops are taken from the fields in March.

The hot west winds generally prevail from March until the setting in of the annual rains in June or July; in consequence of which the lands remain fallow till that period: in the mean time, those fields that are selected for Sugar-cane are partially manured by throwing upon them all manner of rubbish they can collect, and by herding their buffaloes and cattle upon them at night, though most of the manure from the latter source is again collected and dried for fuel.

When the annual rains have fairly set in, and the Assarree crops sown, (in some instances I have seen an Assarree crop taken from the lands intended for sugar-cane,) they commence ploughing the cane lands, and continue to do so four or five times monthly (as they consider the greater number of times the fields are turned up, at this period of the season, the better the crop of cane will be), till the end of October, continuing to throw on the little manure they can collect.

Towards the end of October and in November, their ploughs are much engaged in sowing their winter (or Rubbee) crops; of wheat, barley, gram, &c. and at this period, they make arrangements with the shepherds who have large flocks of sheep, to fold them upon the fields at night, for which they pay so much per beegah in grain.

During the latter part of November, and early in December, the fields are again ploughed well, and all grass, weeds, &c. removed with the hoe; then the surface of the field is made

as smooth as possible by putting the hengah (a piece of wood eight to ten feet in length, and five or six inches in breadth, and three or four inches in thickness, drawn by two pair of bullocks and the man standing upon the wood to give it weight), over several times for three or four days in succession. This makes the surface of the field very even and somewhat hard, which prevents the sun and dry west wind from abstracting the moisture, which is of great importance at this period of the season; for should there be no rain there would not be sufficient moisture at the time of planting the cane to cause vegetation.

In this state the lands remain till the time for the planting the cane cuttings, which is generally the 1st to the 15th February; but should there have been a fall of rain in the mean time, or excess of moisture appear, the field is again ploughed and the hengah put over as before.

A day or two previous to planting the cane, the field is ploughed and the hengah lightly put over.

By exchanging work with each other they engage a sufficient number of ploughs to finish a field in one day; that is, from 7 or 8 o'clock in the morning till 1 or 2 P. M., so that the whole field when the cane vegetates may appear the same.

The cane cuttings (the tops of the previous year's cane), are brought upon the field in large bundles cut into lengths from 9 to 12 inches, and a sufficient number of boys are engaged to follow the plough and drop the cuttings, so as not to detain the ploughs when they once commence work.

The sides of the field are generally sown with (*) which forms a prickly hedge when grown up to prevent the cane from being grazed by cattle and goats.

In planting the cane they commence a furrow round the field, in which they drop the cuttings, the second furrow is left empty; cuttings again in the third, so they continue dropping cuttings in every second furrow till the whole field is completed, finishing in the centre of the field. The field remains in this state till the second or third day, when for

two or three days in succession, it is made even and hard upon the surface with the hengah as before stated.

Within thirty or forty days the sprouts of the cane begin to appear, and as soon as well above the surface of the ground (and earlier if much grass appears), they give it a complete hoeing, which is repeated three or four times previous to irrigating, if they can afford the expense of so doing.

Previous to the last hoeing, they put on what manure they possibly can, 10 to 15 cart loads per beegah or more if possible.

When the last hoeing, previous to watering, is finished, they make the whole field up into small spaces of 8 to 10 feet in breadth and 10 to 15 in length, with a wooden hoe, making a small ridge of earth between each space, and upon any second ridge a drain is made to receive the water from the principal drain that leads from the well, so as to allow the water to run into each space freely. The irrigating commences from the 15th of April to 1st May. Much depends upon the weather, for if much east wind prevails they put it off as long as possible; as the moisture remains much longer than when the wind is from the west, and in a season of much east wind two waterings is quite sufficient; but not so with a west wind, and they frequently work during the night, which enables them to put the water over a much greater surface of ground, and at the same time it has much more effect.

Between each watering a hoeing is given, and after the last watering a final one.

When the annual rains cease, they bind up the canes with the small sucker canes and leaves of the large.

Upon some of the alluvial soils on the banks of the Ganges and Goomtee, I have seen crops of cane produced without irrigating at all, though they seldom expect much produce from such crops, and they are frequently destroyed by drought.

The description of cane in general use is of two kinds, the Mhungo and Huowah (but has different names in different pergunahs); the former is of tolerable size, and yields

the finest goor and white sugar; the latter is a smaller cane and yields rather more juice; but has the bad quality of the goor and sugar, being dark-coloured.

With early planted cane, they commence manufacturing in December, but it is not general till January.

The statement annexed is at the highest maximum rate, for cultivating, manufacturing, produce and profits; it was made up by several zemindars and other cultivators of cane, and I have since shewn it to several others; who all agree, when hired labour is employed, it appeared very much exaggerated, but upon mature consideration it is not so.

In most cases, they manage with the assistance of their families the principal part of the cultivation, with the exception of irrigating, when they employ men and women to raise the water (and the wells are generally more than 30 feet in depth), in place of bullocks.

With the middling and lower class of cultivators it is the general custom to take an advance from the muhajans, to pay their rents and employ assistance in raising water, for which they pay 18 per cent. interest; if less interest, they pledge their crops as security and enter into an engagement to deliver the goor at something less than the market price (generally four seers more per rupee), and the maund to be 42 seers, the profits are very small indeed, and the crop frequently does not repay them for the labour.

But when they manage all the cultivation within themselves (this is generally the Quivees, or gardeners), and only two irrigatings required, and only reduce the cane juice into goor, the profit is very handsome indeed: they use therefore cane for fuel, no expense of manure, no chokedar to pay and many other items also may be deducted which is real profit to them*, though they generally pay from seven to nine rupees per beegah for the lands they occupy near their houses, and they are decidedly the most industrious and best cultivators for every description of produce. The women labour equally as hard as the men, and a man with his wife will

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cultivate half a beegah of cane, though in watering they would have to exchange work with others of their own class to assist in irrigating.

It is now ten years since I made memoranda from which the above is written, and much has escaped my memory though I believe I am generally correct, and my object in writing out the above is merely to give the Society some idea of the cultivation and manufacture of Sugar-cane as in general practice with the native cultivators, and leave it entirely with the Society to make use of the few remarks I have made in any way they seem disposed.

Statement of the expense of the cultivation, manufacture, produce and profit upon ten beegahs of Sugar-cane, with hired labour.

To land rent for 10 beegahs, 2 years, at 5 Rs. per beegah,	Rs.	100	0
„ Ploughing 25 times, at five ploughings per R.		50	0
„ Conveyance of manure,		10	0
„ Expense of folding 50 sheep upon field for twenty nights, at 3 seers of grain per night, (or the same value in manure,)		15	0
„ Seed cane cuttings, 22 bundles per beegah, at 5½ bundle per rupee,		40	0
„ Coolies employed in planting cane, at 4 rs. per beegah,		28	0
„ Hoeing four times previous to watering, at 5 men per beegah, (or 200, at 1 anna each,)		12	8
„ First irrigation, 3 rs. per beegah,		30	
„ Second ditto, 3-8 ditto,		35	
„ Third ditto, 4-8 ditto,		45	110
„ Two hoeings between and one final after irrigation,		9	6
„ Binding up cane, 1 rupee per beegah,		10	0
„ Chokedar for 12 months watching cane, at 2-8,		24	0
<hr/>			
„ Manufacturing, hire of cattle for mill, hire of mill, conveyance, attendance, &c. say at 12 rs. per beegah,		120	0

SUGAR-CANE CULTIVATION IN MIRZAPORE.

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To 400 maunds dry wood, at 20 rs. per 100 mds.	80	0
„ Rent of boiler 5 rs., manufacture, and men attending boiler generally, at 1-4 per md. of sugar,	130	0
„ Carpenter 1, oil 2-8, milk 2-8, sundry 3rs...	9	0
	<hr/>	339 0
Total, ...	728	6

RETURNS.

By 320 mds. of goor, or first quality sugar, 80 mds. at 8 rs.	640	0
„ Ditto ditto, second quality ditto, 20 mds. at 6 rs.	120	0
„ Molasses, ditto ditto, 157 mds. at 1½ anas, ..	127	9
	<hr/>	887 9
To expense as per contra,	728	6
Net profit,	Rs.	159 3

Second statement of the expense of cultivation and manufacture, produce, and profit upon one beegah of Sugar-cane where hired labour is not employed.

To land rent, say at 7-8 per beegah for 2 yrs.	15	0	0
Deduct on 6 ana crop,	2	13	0
	<hr/>	12	3 0
„ Seed cane cuttings, 22 bundles, at 5½ bundles per re.	4	0	0
„ Hire of mill for crushing cane,	2	0	0
„ Ditto of boiler,	1	0	0
„ Manufacture, always a professional person, (Halwye,)	2	8	0
„ Sundry petty charges,	1	0	0
Total, say Rs.	22	11	0

RETURNS.

By 32 mds. of goor, valued at 2 Rs. per md.	Rs.	64	0	0
Per contra,	22	11	0	
Profit, ..	41	5	0	

III.—*Specimens of wild Tea, grown on the Tipperah hills, and used by the natives; presented by H. WALTERS, Esq., C. S. on the part of Mr. P. WISE, with the following account of it. Dated 12th December, 1837.*

[Read December 13th, 1837.]

I have the pleasure to present, on the part of Mr. P. Wise, a specimen of tea grown in the Tipperah hills, prepared by the natives for common use; also a specimen of tea undergoing maceration with salt in a bamboo preparatory to use.

The tea plant found wild in the Tipperah hills, may not be the same species as that cultivated in China; but as it is evidently a plant of the same family, as will be apparent from inspection of the dry leaves inclosed, there can I imagine be little difficulty in introducing the *true* sort in the same locality. Tipperah, you are aware, is one of our oldest districts bordering on Dacca. The tea however is produced on the hills, in the independent territory belonging to the rája.

I trust the Society may see fit to cause an effort to be made to introduce the *true tea* into this district.

IV.—*The food of Plants.*

No. 1. *Of a series of Essays on Horticultural subjects. By J. W. MASTERS, head Gardener, in the H. C. Botanical Gardens, Calcutta.*

[Read February 14th, 1838.]

Plants live by the nourishment which their roots absorb from the soil in which they grow, and by the moisture which their leaves imbibe from the atmospheric air. If the nourishment afforded by any particular soil, and its surrounding atmosphere be suitable, and supplied in sufficient quantity, the plants that are fed by it will be healthy; if unsuitable or asufficient, the plants will be unhealthy. As the vessels rough which plants receive their nourishment are formed of

extremely delicate tissue, it follows that the substances which enter these delicate vessels must be nearly, if not altogether, in a liquid state; to reduce the ingredients of which a soil is composed to such a state, a proper degree of moisture is necessary, the fertility of a soil depends in a great measure upon its capability of absorbing and retaining moisture.

Soils are, for the most part, composed of the following six primitives, viz.:

Silicious matter, (any kind of sand or gravel.)

Argillaceous matter, (any kind of clay.)

Calcareous matter, (any kind of lime or chalk.)

Ferruginous matter, (any kind of oxide of iron.)

Animal matter, (any kind of animal substance.)

Vegetable matter, (any kind of decayed vegetable substance.)

These substances being united together in one mass, in any proportion, constitute a soil; if there be silicious, calcareous, and argillaceous matter in nearly equal quantities, forming the principal part of a soil, that soil will be fertile; if there exists an excess of either of the primitives, the soil will be proportionately infertile, and no one of the six primitives abovementioned is of itself capable of supplying plants with suitable nourishment, and of supporting them in a healthy state for any length of time.

Every known soil contains a portion of silicious matter. Silica tends to lighten the soil, and to enable the young fibres of the roots to enter it with greater facility; but when it exists in excess it renders the soil unfruitful, making it less absorbent, and less capable of retaining moisture.

Silica is the least absorbent of all the primitives, imbibing scarce one-fourth of its own weight. Calcareous matter imbibes nearly its own weight, and tends to improve the quality of all soils; when it exists in excess, the soil is proportionately infertile.

Argillaceous matter is much more absorbent than either of the two former, it imbibes two and a half times its own weight. A close soil, difficult of cultivation, requiring a

great deal of labour, and a great deal of manure to fertilize it, is yet capable of being made much more productive than either a sandy or a chalky soil, these last requiring a constant supply of manure and a constant supply of water; but if clay be well pulverized, and mixed with the manure supplied, it will retain the virtue of the manure for a considerable time.

Ferruginous matter is diffused nearly all over the face of the earth and enters more or less into most soils, yet very little is known respecting its qualities on the soil.

Animal matter and vegetable matter are the most absorbent, and retain moisture for a great length of time.

To constitute a good soil, it is not sufficient that certain quantities of different kinds of earth be found in it; to render the soil suitable for the nourishment of plants, and capable of supporting them in a state of health and vigor, the several ingredients must be properly mixed together, and very much depends upon the manner in which the different parts are commixed. The more the ingredients of a soil are comminuted or separated into small particles, the greater the power of absorption, the greater the fertility. The more a soil is pulverized, the greater number of fibres are produced by the roots of the plants that are growing in it; the more means the plants have of absorbing nourishment, the more benefit they receive from the dews.

However rich a soil may be, it will become exhausted by continual cropping; it is therefore necessary to strengthen its productive powers by furnishing it with suitable manure, and it requires considerable knowledge of horticulture to enable us to decide at any time what particular kind of manure is proper to be added to a soil intended for the growth of any particular plant. The best manure and that best adapted for general application is, without doubt, a proper admixture of animal and vegetable matter; such as is obtained from a well-managed farm-yard in England: but such manure is not easily procured in this country; and if procurable, is very difficult of application on account of the particular prejudices the natives. Before we can add any thing to a soil

with the least hope of improvement, we must examine the component parts of the soil, taking into consideration also the nature of, and the necessary food required by, the particular plants that we wish to rear upon it; we may then add such ingredients as we know the soil to be deficient in, we may be certain of, effecting improvement.

The following substances may, by proper application, be made to answer the purposes of manure. Sand, clay, alluvial soil, lime, bones, chalk, mortar rubbish, cowdung, fish, oil-cake, rotten leaves, grass, green-crops, and the sweepings of houses, manufactories, and streets. Sand is a much more useful article in horticulture than many are aware of, few good soils have less than one-third sand, and many contain three-fourths sand. Sand may always be added with advantage to any stiff binding soil, to any soil in which there is an excess of clay, of chalk, or of vegetable matter. Fine sand is most essentially useful for the growth of many of the most delicate shrubs, and particularly so in propagating all kinds of plants by cuttings.

Clay may be applied as a manure to any sandy, gravelly or chalky soil, whenever it can be procured; if dug up from a considerable depth below the surface, it requires to lie exposed to the influence of the sun and air for some time before it is fit to be applied to the roots of tender plants.

Alluvial soil from tanks, banks of rivers, &c. consists of some of the best of the surface soil, of fine sand, and decayed vegetables, which have been washed down by heavy rains; it may be procured in great plenty during the months of April and May. Alluvial soil may be applied immediately it is dug up to any sandy or chalky soil, but for the purpose of potting plants in, for forming new flower borders, or plantations of fruit trees, it requires to lie exposed to the influence of the sun and air for a few months.

Lime is particularly well suited as a manure for any stiff soil, but is not so applicable to light soils; yet, as there is but a very small quantity of calcareous matter to be found in this part of Bengal, lime may be frequently used to ad-

vantage at the rate of about 20 maunds per *beegha*, in which case it may be spread over the ground and dug or ploughed in immediately ; or it may be mixed with other substances, and united with them into a compost, fit to be used as a manure for any soil. Lime, mixed with alluvial soil in the proportion of one maund of lime to one cubic yard of soil, will form an excellent manure for any sandy soil. Whenever lime is used it should be dug in, and incorporated with, the soil immediately it is applied.

Bones contain lime and oil, and form an excellent manure.

Chalk, and rubbish of old buildings, may be applied with advantage to any stiff clay.

Cowdung is excellent for all kinds of kitchen-garden plants, and has an advantage over horsedung, as it may be used without previous fermentation, it may be applied fresh and dug in directly ; it may be used to great advantage after it has undergone fermentation, having been well mixed with straw, grass, leaves, or any vegetable substance, and a good portion of fresh earth, the ingredients of the whole mass being well incorporated together, and then spread thickly over the ground, and dug in immediately. By these means a larger quantity of manure is obtained, the cowdung improving the qualities of the other ingredients ; yet it is not essentially necessary for the cowdung to undergo fermentation before it is applied to the soil.

Fish form an excellent manure, and may be used in any soil ; they cannot be used too soon after being caught.

Linseed cake is a valuable manure, and may be applied to any wet clay, at the rate of six maunds per *beegha* ; it may be broken fine and scattered over the ground and dug in directly, or sown and covered with the seed.

Rotten leaves make a very good vegetable mould, proper for mixing with any other manure to be applied to soils consisting chiefly of sand, chalk or clay ; leaf-mould is very proper for mixing with sand as a substitute for peat, and for softening and lightening the soil for tender plants. The leaves may be collected, and laid in large heaps to fer-

ment and rot,—should never be burnt; burning vegetable matter most effectually destroys the properties which render it valuable as manure. Grass, when properly fermented and rotted, forms a valuable manure for any sandy soil.

Green crops, dug into the ground just as they are coming into flower, form a valuable manure for sandy or chalky soils. Any succulent plant, sown thick on the ground and then dug in altogether while in a growing state, will improve the soil. When the crop can be fed off by sheep or bullocks on the ground, the manure obtained becomes much more valuable.

Jhanjee, (pond-weed,) as well as sea-weed, is a useful manure; when used as such it may be dug in at once, or mixed with earth, or applied as a top-dressing to growing plants. It may also be very advantageously made use of in the hot and dry season, to put round the stems of fresh-planted trees, or to cover the surface of earth in pots.

Sea-weed is excellent for onions, broccoli, and potatoes.

The sweepings of streets, scrapings of roads, of drains, &c. with heaps of rubbish accumulated from different sources, generally contain the best possible manure; and that which is applicable to any kind of soil.

No. 2. *Of Mr. Masters' Essays on the propagation of Plants.*

[Read April 11th, 1838.]

The most natural method of multiplying plants is that of sowing their seed; and for rearing forest trees, many kinds of grain, annual flowers, and culinary vegetables, this method is usually adopted; as also for obtaining new varieties of cultivated kinds; but it fails in cases where the parent plant has been at all improved, or in any manner changed by cultivation. This observation holds good when applied to perennial plants, but it is not at all times applicable to annual, nor to biennial plants; as we have many varieties of valuable grain, many varieties of delicious fruit, many varieties of wholesome

vegetables, and many varieties of elegant annual and biennial flowers which are continued from year to year, by merely keeping them distinct from other varieties, and carefully sowing their seed.

The most approved fruit trees which are now cultivated in Europe, such as the best varieties of apples, pears, plums, peaches, cherries, strawberries, &c. have been so much improved by cultivation, that they bear but little resemblance to the parent plants from which they originally sprang; and can be propagated by artificial means only; seedlings from highly improved varieties seldom, if ever, exactly resemble the plant which produced the seed from which they have been raised, they are generally inferior.

“The embryo of every seed contains two essential parts: the *radicle*, which protrudes itself into the earth and forms the root; and the *plumula*, which ascends into the air, and forms the stem. When the root is established in the soil, it affords nourishment to the stem; the stem thus supplied with nourishment, continues to elongate, and produces buds and leaves. As at the very commencement of vegetation in a seed the radicle issues from the neck of the embryo downwards, and the plumula upwards, so in the development of every succeeding bud, a similar process is repeated; fibres issue from the base of the bud, and descend through the stem into the root; the stem elongates upwards, forming new buds, which are hereafter to be developed.”—Vol. III. page 2.

It hence appears that every individual bud, contains the principle of vegetable life, and is sufficient of itself to form a perfect plant, exactly like that on which the bud itself is found growing. This circumstance enables us to make use of artificial means of propagation; and the most simple method of increasing the number of any desirable variety, is that of propagating by single buds. The torn bud is made use of when treating of woody plants, and eye, or clove, when treating of herbaceous, tuberous rooted, or bulbous plants. Hence we have increasing by buds, increasing by single eyes, and increasing by cloves; this last method is

practised to a very great extent all over India, in the cultivation of the common onion; the cloves are detached from the original root and planted out to form separate individuals. All bulbous plants may be increased in a similar manner; for all offsets produced at the side of the root, by whatever name they may be called, are in reality buds, and will, if placed in suitable soil and situation, produce roots downwards and stems upwards. Increasing by single eyes is practised in the propagation of tuberous-rooted plants, a single eye with a small portion of the tuber, sufficient to keep it alive for a few days, and enable it to start, is put into suitable soil and a new plant is obtained. In preparing sets of the potato, two or more eyes are often taken, but one good healthy eye is sufficient to form a plant, and far better than a cluster of eyes, which generally produces much halm, but small tubers. Dahlias, turmeric, ginger, arrow-root, horse-radish, with many other plants having similar roots may be propagated by single eyes.

Vines, sugar-cane, with some others may be increased by planting single buds, but the usual practice is to take two or more buds, the method is then called propagating by cuttings. When preparing cuttings, make choice of young shoots, the wood of which is well ripened, cut off the lower end as close as possible to the under side of a healthy leaf-bud, cut it smooth and perpendicular to the stem; let the cutting be from four to eight inches long, according to the habit of the plant. Many species strike more freely having the leaves and terminal bud of the cutting left entire; the leaves supply a portion of nourishment until the descending fibres have time to strike into the earth and form roots; in general the leaves should not be taken off from the upper part of the cutting, but suffered to remain until they drop off of themselves, their dropping off is a sign that the cutting is likely to strike root; if the leaves wither, and dry up without falling off, we may conclude that the cutting is dead. Herbaceous plants, and many small delicate shrubs strike root most readily from the tips of branches, having the terminal

bud, but they require to be covered with a glass, to be placed in the shade, or to be covered by some means in order that they may be sheltered from the direct rays of the sun, and from heavy rains, and preserved from evaporation. The terminal shoots being more succulent than the ripened wood do not strike so freely in this country, without the assistance of some transparent covering; if planted in the rainy season, they rot before they have time to strike root; if planted in the dry season they are burnt up by the sun. When the cuttings are prepared, plant them in soil composed of equal parts of loam, vegetable mould, and fine sand, this is a suitable compost for such as strike freely. Equal quantities of vegetable mould and fine sand form a suitable compost for some of the more delicate kinds of shrubs; many of the delicate species will strike in fine sand only.

For all the hardy kinds which strike freely in the open ground, the rainy season, during the months of June, July and August, is the most suitable time for planting the ripened cuttings. For geraniums, and similar herbaceous plants the cold season is most favorable, during the months of November, December and January.

In exogenous plants, the annual increase of the stem takes place between the bark, and the wood that was formed the preceding year, the fibres descend from the buds immediately under the bark into the root. If then we take away the bark, the fibres will be laid bare, and by applying a ball of suitable compost, the fibres may be conducted into it, and induced to form roots before they reach the ground; by this means a new plant will be obtained. This method is called increasing by *gootees* (Anglice Balling), and is very successfully practised in this country. Select a firm, healthy branch the wood of which is well ripened, and immediately under a leaf-bud, take off a small ring of bark about an inch wide, scrape the woody part well, so that no bark remains, apply a ball of well tempered clay, bind it on securely with tow, or other soft bandage, make it fast to a stake if necessary, hang a small pot having a hole in the bottom just over the

gootes, and supply it with water daily : in a few months you will obtain a fine well-rooted plant. The above is the Chinese method of propagation, and is well adapted for raising large plants in a short time ; a large well-rooted plant, having several branches, may be obtained in the course of two months by this method from the Indian rubber tree ; the leechee requires four months to form good roots. In propagating by layers the branch is allowed to remain on the parent plant until it has struck root. Select a branch that is near the ground, and at the distance of a few inches from the terminal bud cut the branch to one-third of its diameter through, or remove a ring of bark as above, close to the base of a leaf-bud, cut off a portion of the bark and wood to about an inch below the bud, peg that bud down into the soil, and cover it over with light earth. Or a ring of bark may be taken off exactly in the same manner as recommended for *gootes* ; roses strike very freely when thus treated, but require to be watered daily. When a ring of bark is taken off immediately under a leaf bud, if the operation is properly performed, the branch must either strike root or die. Whereas if a portion of the bark is left entire, the descending fibres may pass down on that side, and the wound ultimately heal, without producing any roots. If the branch is not conveniently situated for bringing into the earth it may be conducted into a flower pot, and supported by a stage. Layers that are made in pots require much more water and attendance than those made in the ground.

As a single bud contains in itself all that is necessary to form a tree, we may take a bud from one tree and insert it under the bark of another tree ; where it will send its fibres down between the bark and the wood of the stock into the root, at the same time elongating upwards, developing new buds, leaves, and branches. This operation is called budding, and is always performed on trees of the same family. Choice roses are budded on inferior kinds, or on such as are easily propagated ; peaches are budded on seedling peaches or on hardy plum stocks ; choice varieties of oranges on seedling

oranges, &c. In propagating by seeds, cuttings, *gootees*, and layers, we in each case increase the number of individuals ; but the number of individuals is not increased by the process of budding, merely the number of a particular variety.

Having a seedling peach tree, and wishing to improve it by budding it with a superior kind ; take off a cutting from the approved tree, choosing a branch, the wood of which is healthy, and well ripened ; then make choice of a smooth part of the stock not more than a foot from the ground, and with a sharp knife make a cross cut through the bark, and a perpendicular one immediately below the first, a little more than an inch in length. Then cut off a healthy-looking bud from the cutting of the desired sort, setting in the knife above the bud, and cutting off a portion of the wood to an inch below the bud ; holding the bud firmly between the finger and thumb, take out the wood, all, except that which is immediately united to the bud ; open the bark of the stock very carefully, and insert the bud between the bark and the wood ; bind the bark close round above and below the bud with tow, or other soft bandage, and shade it from the sun by a little case made of a bit of plantain leaf. The most convenient season for performing the operation of budding is from the beginning of the month of November, to the end of January, though it may be performed at any time, when firm healthy buds can be obtained.

If instead of a single bud, a cutting, with two, or more buds be taken from a valuable fruit tree and united to a wild seedling for the purpose of improvement, the operation is called grafting, and it depends on the same principles as that of propagating by single buds. Grafting, as performed in this country, is what in English is termed inarching, and is analogous to propagating by layers, save that it does not increase the number of individuals ; it may be performed at any season of the year. Seedlings are raised in pots, and after one year's growth are placed near the tree intended to be propagated, and arranged in such manner that branches brought down to unite them to. Select a smooth

part in the stock, and cut off a portion of bark and wood together, about two inches in length, then select a branch from the tree nearly of the same size as the stock; and having cut off a similar portion from the branch connect the two together, as neatly, and as firmly as possible with strong bandage. In the course of two or three months the branch will become completely united to the stock and may be separated from the parent tree. The best varieties of mangoes are generally propagated by this method, it is easily performed, and seldom fails. Owing to the great quantity of resinous juice in the mango tree, and to the circumstance of trees in this country being nearly always in a growing state, the mango does not take so well by whip-grafting nor by the other methods commonly practised in Europe. In whip-grafting the head of the stock is cut off, and the scion also is cut from the tree, a slice of the bark and wood is taken from the stock, in an oblique direction, and the scion is cut to fit it; the two are then so united together that the inner bark of the scion exactly corresponds with the inner bark of the stock; they are then bound with strong bantlage, and covered with well tempered clay. The *aloobokara* takes well by whip-grafting.

There are various methods of preparing the scion and the stock for grafting, but the principles are in all the same; the inner bark and wood of the scion must be so united to the inner bark and wood of the stock, as to enable the descending fibres of the scion to pass without obstruction between the inner bark and wood of the stock into the root.

Strictly speaking there are but two methods of propagating plants, viz. sowing their seeds, and planting their buds; and all the variations of the latter method are also reducible to two; viz. planting buds in the earth, and planting buds in living trees; and they receive different appellations accordingly.

COTTON.

V.—Cotton.

Report of the Cotton Committee, on certain Samples of Cotton produced in Mhairwarrah from Seed originally furnished by the Agricultural Society of India.

(Read April 11th, 1838.)

From R. Davidson, Esq. to the Secretary, dated 8th December, 1837, enclosing extract of a letter to his address from a friend at Beaur in Mhairwarrah, under date 18th November, 1837, forwarding a small sample of Cotton grown in a garden at that Station from American Seed.

From Lieut. Charles Burnett, to the Secretary, dated Mhairwarrah, November 1st, 1837, forwarding by Dr. Maclean, the several parcels of Cotton* alluded to in his letter of the 27th October last, and requesting an opinion on their qualities. *

The Committee having examined several samples of Cotton, referred to in the margin, are of opinion that,

Mr. Davidson's sample, is very superior, having a remarkably long staple, and excellent in point of strength, but not equally so in fineness. The sample is however much too small to be of any value as a subject of comparison, and your Committee would wish to have some information, as to where the seed was procured.

* N. B. These samples are produced from either of the following varieties, viz.

October 10th, 1835. Despatched by the Secretary a parcel of *Perumbuco Cotton Seed*.

April 25th, 1836. Despatched a parcel of *Egyptian Cotton Seed*.

April 27th, 1836. Despatched two varieties of Seed from *Rio Janeiro*, presented to the Society by Lord Auckland, and a small parcel simply styled "*American Cotton*" presented by Mr. McCullogh gardener to the Pasha of Egypt, and brought by him from Rio Janeiro.

supplies were forwarded to Capt. Dixon.

Lieut. Burnett's Samples.

No. 1.—Very inferior, unhealthy, deteriorated and rotten.

No. 2.—Of mixed quality, resembles what is called *Stained Sea Island*; on the whole as a general muster, it is very satisfactory.

No. 4.—Very inferior.

The Committee have given their opinion upon Mr. Davidson's sample and upon Nos. 2 and 4 of Lieut. Burnett's musters, supposing them to be sea-island; but it would be interesting to ascertain what sorts of seed were planted by Captain Dixon, and would recommend that the Secretary be directed to ask for further information on this point, and for a larger muster of that cotton which has been sent through Mr. Davidson.

W. SPEIR.

G. A. PRINSEP.

W. STORM.

JOHN BELL.

Directions for cultivating the Seychelles and Bourbon Cotton, communicated by Mr. N. Savi, in a letter to Messrs. Scott and Co. of Mauritius, under date November 26th, 1837.

(Read April 11th, 1838.)

“To make the cotton tree produce a fine quality of down, it is necessary not to suffer it to grow more than three feet high, which may be done, as much as possible, on the time of the first efflorescence, in cutting off the tender tops of the stems. The trees, in a rich and fertile mould, are to be planted six feet apart: being stopped in their ascendant growth, they spread wide in a circle of a considerable diameter.

“The above is local information which I have been able to gather when I was on the spot in 1825. It is confirmed by all those who understand the cultivation of the cotton tree.”

VI.—*Honey Bees.*

Remarks on a captured Hive, by Mr. R. Smith of Calcutta, communicated in a letter to the Secretary, dated 22nd March.

(Read 11th April, 1838.)

Understanding that no resolution has been come to, on Captain Carter's proposition for offering a premium to "any person who shall successfully domesticate in the plains the indigenous or wild honey bee," in consequence of the want of information which prevailed at that time on this subject, I venture to submit to the Society my limited experience with respect to it, in the hope that the question may now be revived. From the opportunities I have had of observing their habits I should say, that though of a smaller size than the Europe species, the Bengal bee is fully as industrious, and the honey contained in the combs made by them, as pure as that produced in England; and they possess the advantage of being less vicious, so much so, as to permit a person to stand close to their hives, without exhibiting any indications of attack. In proof of this, I need only observe that in securing the second hive mentioned in this communication, I was obliged to remove two large bricks under which they had made a lodgment, and formed a comb of nearly a seer in weight. Yet in thus rudely breaking up their habitation and exposing them and their stock of sweets to the air, far from scattering and attacking every animal within reach, these clustered quietly on their comb, and in that state allowed a jallah to be inverted over them, which forms their hive, the lower part being built up with bricks and mud, while one small round hole bored in the jallah serves all purposes of ingress and egress. The other hive is of wood, and much more artificial. The latter contains a small swarm of young bees with two or three incipient combs. It was hived about the time of the moon in February by the simple method of turning a box with the

lid off, against the flue of the house I inhabit, and in which a cluster of young bees had swarmed, leaving a hole in the back of the box for them to go in and out. For the first week or so the bees were fed with honey introduced through the aperture, and in about a fortnight they had commenced their comb. I observe that the bees attach themselves most to the flowers of the poppy and mignonette, also to the spathe of the plantain; but in default of these, any kind of flower is used by them. From the fact of bees having constantly frequented this place, I have little doubt of being able to domesticate and extend the stock at the period of swarming, by affixing spare hives in the vicinity of the two I have. The method I have pursued may be considered rude, but as a first step towards reclamation of a valuable insect, I trust this defect will not be considered of moment. As experience furnishes me with hints, I trust to improve; and as the animals become accustomed to restraint, to manage them on the same principles as obtain in Europe.

I shall be happy to shew the "skeps" to any one who may have a curiosity to see them.

Memo.—Mr. Smith communicated verbally to the Society at a General Meeting in April, that the bees had all emigrated from the hive.—J. BELL.

VII.—“Caoutchouc.”

The Society's gold medal was presented to Lieut. Hamilton Vetch, for one maund sample of the best Assam Caoutchouc.

The following communication from Lieut. Vetch to the Secretary, dated Tezapore, Assam, 13th February, 1838, has reference to the prize sample.

[Read 14th March, 1838.]

I have the honor to acquaint you that in compliance with the conditions mentioned in your letter of the 23rd Decem-

ber, I have this day despatched a maund of Caoutchouc to your address, which I hope will be found fully equal to what was formerly inspected by the Society.

The present is more transparent, and not so dark in color as the former; this arises from its having been more carefully prepared, and dried in the shade, while the other was exposed to the sun which is thought to have a prejudicial effect on the gum. It is very probable, however, that time and exposure will deprive this of its transparency; indeed some of the specimens, which were made up in the form of bottles, have already become black.

In the box you will find a specimen attached to the vessel in which it was made, which will serve to illustrate the manner in which it is prepared, and which I believe I before explained. Those specimens in the form of a bottle are made exactly in the same way, only in an earthen gurah instead of a bason, and it becomes necessary to destroy the vessel to get out the latter kind. I have also sent some small specimens of the gum which were prepared in the same mode, with the addition of a solution of alum which was mixed with the milk, and allowed to evaporate during the process of drying, it seems to have the effect of clarifying the gum, and likely to prove of much importance, and for the discovery we are indebted to Dr. Furnell of Bishnauth, who recommended me to try the experiment.

The milk is extracted from the tree by cutting a notch in the roots that are partially exposed, a small excavation is made in the earth on both sides of the cut into which leaves are placed to receive the milk; in this manner from 8 to 20 pounds may be drawn from one tree in the course of two or three days, after which the flow ceases, but the operation may be repeated in fifteen days, when a smaller quantity is obtained.

I have lately skirted about 25 miles of the Noudoar forest, which is a continuation of that of Churdoar, and I observed the ficus elastica in considerable abundance towering above the other trees.

If there is any further information desired by the Society on this subject that I can give, or obtain, I shall be most happy at all times to reply to your queries to the best of my ability.

Observations on Caoutchouc, communicated in a letter from Dr. Royle to Dr. H. H. Spry, dated London, 12th July, 1837, and submitted by that gentleman to the Agricultural Society of India.

[Read 14th March, 1838.]

From the note in the accompanying sheet from the forthcoming number of my work, you will see that there is no doubt of Caoutchouc of very superior quality being abundant in the districts of Silhet and Assam, the only difficulty will be to get the natives to collect it in the form best suited to the principal objects of the company. They are already well aware of the mode of procuring it from the trees which yield it, but they collect it in irregular masses much intermixed with dirt and other extraneous matter from which there is no disengaging it; to be at all available, it must be free from dirt, as the use to which it will be put requires that it be cut into threads. The Caoutchouc should be collected in thin coats or layers so as not to allow of any air to be between them, this will be effected by letting one coat become nearly dry before another is applied; the thickness of the whole should be about half an inch; the best form in which it could be sent to England, would be in cylinders of about eight inches in length and about four inches in diameter. The Company have already sent models to Calcutta to the Asiatic and Agricultural Societies with directions.

Extract from Royle's Illustrations of the Botany of the Himalayan Mountains, on the subject of Caoutchouc.

The *Arta rpeæ* contain many plants very important in an economical point of view; as the mulberry, already men-

tioned, for feeding the silk-worm; it is interesting to find, as stated by Dr. Roxburgh, that next to mulberry leaves, they prefer those of the *pippul*, or *Ficus religiosa*, also a plant of this family. The bread-fruit tree (*Artocarpus incisa*), belonging to the genus which gives its name to the family, forms a large portion of the food of the South Sea Islanders. The jak (*A. integrifolia*) affords an agreeable fruit; its seeds roasted, are much eaten in the south of India and in Ceylon. *A. Lakoocha* and *echinata* form very inferior fruits, though they are eaten by the natives of the countries where the trees are indigenous. *A. integrifolia* and *Chaplasha* yield excellent timber. The figs are well known for their delicious fruit, though this is not usually produced of a fine quality in all parts of India; but varieties of *F. Carica* are common in gardens, and might no doubt be much improved, as they are produced of a fine quality in the Bombay presidency, in the south of Europe, and Asia Minor, as well as in Northern Africa. The fruit of other species is eaten by the natives of India, as of *F. glomerata*, *hirsuta*, *scabrella*, and *virgata*.

The *Artocharapeæ* all abound in a milky juice, frequently of a bland nature; as in the cow-tree, or *Pithecolobium* of South America, supposed to be related to *Brosimum*, and abounding in caoutchouc. But it is often united with an acrid principle, secreted in some in so large a proportion as to render them poisonous; as witnessed in *Ficus toxicaria*, and especially in *Antiaris toxicaria*, the Upas-tree of Java, owing to the presence of *Strychnia*. So, in the *Apocynææ*, we have seen the equal presence in the same family, of caoutchouc-yielding milky juice, either of a bland nature, or combined with an acrid principle. Many species yield tenacious juice, of which bird-lime is frequently made, as *Artocarpus integrifolia* and *Lakoocha*, *Ficus indica* and *religiosa*; also, *F. Tsiela*, *Roxburghii glomerata* and *oppositifolia*. From some of these an inferior kind of caoutchouc has been obtained; but in considerable quantities, and of a very good quality, from Dr. Roxburgh's *F. elastica*, which

he describes as being of the size of a mango tree, or full-grown sycamore; the older trees yield a richer juice than the younger, from incisions cut in the bark all round the trunk from its base to the top. Of this milky juice, 50 oz. yielded 15½ oz. of the clean-washed caoutchouc. With the milk the natives pay the insides of their vessels and baskets, so as to enable these to hold liquids: the caoutchouc furnishes them with candles and flambeaux. Dr. Roxburgh discovered many years ago that it was perfectly soluble in cajeputi oil, rather an expensive medium, but sufficient to indicate the kind of menstruum of a cheaper nature which would dissolve it. The other plants made known by Dr. Roxburgh as secreting caoutchouc are, *Urceola elastica*, which yields in Penang the best kind, *Willoughbeia edulis*, and *Melodinus monogynus*, (v. p. 270.)*

* Since the above passage was in type, I have received specimens of the caoutchouc of *Ficus elastica*, from Mr. G. Swinton, late Chief Secretary to the Bengal Government, who had it collected so long ago as 1826 in Silhet, and sent it to Sir D. Brewster for experiment; but it never attracted the notice of commercial men, either in India or England. Notwithstanding that Professor Seddon, at the desire of the late Mr. D. Scott (so well known for his zealous endeavours to elicit the resources of the districts committed to his charge), sent it from Assam to a principal house of agency in Calcutta; but was informed that "the article being unknown in this (the Calcutta) market, we are sorry we can give you no idea of its value:" and this, in March 1828, when it was selling in London for two shillings a pound. As caoutchouc has now become an extensive article of commerce, and a company has been formed in London called the London Caoutchouc Company, of which one of the objects is to encourage the collection of this substance in India, so that the home manufactures may not be dependent upon too limited a field of supply, it cannot but be highly gratifying to Mr. Swinton to have his early anticipations of its value so completely substantiated. This, the more so, as so few were found either here or in India, who perceived the importance or encouraged the prosecution of his exertions, to bring not only this, but many other Indian products into notice: several of which might by this time have become important articles of commerce. It is curious that Mr. Swinton should also have been the medium of communication with Mr. Scott, for announcing the fact of the tea-plant being both indigenous and cultivat-

VIII.—Guinea Grass.

Further notices on Guinea grass, Rye grass, &c. with reference to what has been already done in the way of distributing seed, &c.

Extract of a letter from Major Gwatkin to the Secretary, dated Coel, May 2nd, 1838.

[Read 13th June, 1838.]

“The French oat seed you kindly sent me, came too late in the season to expect a crop; I threw in a small portion into my garden to ascertain if it would vegetate, which I am happy to say it did, and has produced a few heads, but *no grain*.”

ed within our then newly-acquired territories in Assam. As the caoutchouc was pronounced to be of no value, so the tea was said to be only a camellia; and as the former has come to be so desirable an article for a commercial body here; so has the latter become an object of solicitude even to the Indian Government: a scientific expedition, headed by Dr. Wallich, having been sent into Upper Assam to explore the tea country, whose report the scientific world are anxiously expecting.

I have been favoured with a letter from my friend, Professor Christison, of Edinburgh, who obtained specimens of the above East-India caoutchouc, after it had been eight years in the country, and employed it in making a flexible tube for conveying coal-gas. Respecting it he says, “I can most decidedly state, that so far as my trials go, it is a far better article than is commonly thought, and quite fit for many most important economical uses.” Since the arrival in London, from Mr. Swinton, of the specimens of this caoutchouc, they have been submitted to experiment by Mr. Sievier, the sculptor, so well known for his numerous experiments on, and important applications of, this substance. He pronounces the India-rubber from Silhet, though carelessly collected, and so long ago as eleven years since, to be equal in elasticity to the best from South America, and superior to it from lightness of colour, and freedom from smell. There can be little doubt, therefore, of its becoming an important and profitable article of commerce, since nearly 500 tons of caoutchouc are now imported from other parts of the world; and its applications and uses are so rapidly increasing, that it is not possible at present for the supply to keep pace with the demand. It may be hoped, therefore, that some enterprising individuals

“ The *Guinea grass seed*, of which you had at one time a doubt*, vegetated, and I shall be ready by the rains to make my plantation.

“ The *Italian Rye grass* first received also vegetated, though sown at a bad season, (December;) there has sprung up an abundant crop of fine rich grass, and cattle of all kinds appear fond of it. The grass is now coming into flower, which I shall collect, to sow in the rains: but I fear it is not a grass for this part of the country. It requires *constant* watering—a crop of lucerne would have given three cuttings—yet am I no advocate for lucerpe. I consider it a sour poor grass.

“ The very extraordinary season we have had, and I may say still have, renders all garden experiments vain; land watered to-day has a hard dry crust over it to-morrow; our

will be induced to collect carefully, that is, keep clean, the milky juice of *Ficus elastica*. The tree is called *kasmeer* by the inhabitants of the Pundua and Juntipoor mountains, which bound the province of Silhet on the north. It is also found near Durrunj, in Assam between the Burrampooter and the Bootan hills. The highest price for caoutchouc can, however, only be obtained for that which is collected in the bottle-form; or preferably in that of a cylinder of $1\frac{1}{2}$ to $2\frac{1}{2}$ inches in diameter, and 4 or 5 inches in length, according to the models sent by the author to both the Asiatic and Agricultural Societies of Calcutta. Much useful information will be found on this subject in Dr. Roxburgh's *Flora Indica*, vol. iii. pp. 541-545; also, in his article on *Urceola elastica*, or caoutchouc-vine of Sumatra and Pulo Penang, following another by Mr. Howison on the same subject, in the fifth volume of the Transactions of the Asiatic Society of Calcutta. *Vide* pamphlet on the plants which yield caoutchouc, by the author.

* This doubt arose out of a communication I received from Dr. Wallich, who stated, that on examining the seed I had sent him, through the microscope, he apprehended that I had reaped it too soon, and that it would not germinate. This intelligence gave me great uneasiness, as I had already sent parcels to many applicants, and I immediately advised Major Gwatkin to whom I had sent a large quantity; but on putting the seed to practical test, my fears were wholly dispelled; and from Dr. Wallich and many other gentlemen, I have since had the most satisfactory intelligence of the immediate vegetation of the seed on being sown.—J. B.

strawberries have been a general failure, our peaches very unpromising.

“The parcel of American maize reached me safely, and I have given it out in small portions to those I think will take care of it; our season for sowing this grain is now at hand.

“I obtained from a friend the other day a few seeds of the famed Cashmere grass called the “*Prangos*.” If it succeeds I will send you a portion of the seed raised. I recollect Mr. Moorcroft writing greatly in favor of this grass. I have no idea what species of grass you have, as given to you by Dewan Ramcomul Sen.”

Extract from a letter of R. Montgomery, Esq., C. S. (late) Secretary to the Azimghur Agricultural Society to the Secretary, dated Allahabad, May 23rd, 1838.

[Read 13th June, 1838.]

“The *Guinea grass* seed you sent to Azimghur has come to great perfection.”

Extract from a letter of Major Parsons to the Secretary, dated May 4th, 1838.

[Read 13th June, 1838.]

“You will be glad to hear, that I have some very nice *Guinea grass*, raised in your mode and from the seed you were so good as to send me to Hissar in 1836-37, part of which I brought with me to this.”

Extract of a letter from Captain Burnett, dated Beawr, June 8, 1838.

[Read 11th July, 1838.]

“The *Guinea Grass* has come up beautifully in a small bed, I am waiting until the rains set in to transplant it.”

Note by the Secretary.

The Committee of Papers having requested me to append to these notices, any further experience and practice of my own, and to reprint the brief directions which I drew up for the purpose of transmitting with every parcel of seeds, I have great pleasure in complying with such request, although I can add little to what I have already stated in a former memorandum*, and where the same instructions for sowing and planting are given.

The last published notice of this grass, is the report of a Committee appointed to examine my cultivation† which was read at a general meeting of this Society on the 13th December 1837, when it was,

“ Resolved, that Mr. Bell is entitled to the Society’s Silver Medal and 2nd class premium for his cultivation of Guinea Grass, and to the first class premium for seed from such cultivation provided no other competitors appear before the 1st January 1838.”

No other competitors having come forward the medal and premia were awarded accordingly.

My cultivation measured by Messrs. Burn and Co.’s Estimate, nearly ten beegahs and a half, which I have maintained for pasturage, and to admit of seeding, in case of the last year’s supply falling short, or being injured by the ensuing rains. I have fenced off the park into five divisions, two divisions for sheep and goats, &c. with giran sticks, and two larger divisions with bamboo, for horned cattle and horses; the fifth division is reserved to admit of the grass growing, and to be cut, for cattle within doors. Into one of these paddocks I turn the cows and horses, allowing them to remain until the Guinea Grass is cropped quite short. I then turn them into the next division, where the grass has had time to shoot up; when this has been cropped down I turn them back into the former division, and so on. By this

* See Transactions, vol. 5, page 82.

† Ditto, vol. 5, page 200.

means they have a continual supply of rich and nourishing food. The same method is pursued with the sheep, and by giving each division access to the margin of my tank I am saved all further trouble. I find cows, horses, sheep, goats and deer all very fond of this grass, and they will touch nothing else until it is cropped down to the hard stalk near the root.

If the general cultivation of this superior grass be not adopted, the fault will not be mine. It has been freely distributed to all who have asked for it, and sufficient time has not elapsed, to form an opinion, as to the prospect of it being permanently established.

I hope that parties to whom it has been given, will not fail to communicate the result of their sowings, whether successful or not. I am firmly persuaded that if they give it a fair trial, they *must succeed*.

For previous notices on this subject I would beg to refer to volume III. Transactions, pages 46 and 49.

Names of Parties, to whom my Guinea Grass Seed has been distributed.

		Mds.	Seers.
Nov. 8, 1837.	Sent in to the Society's Store,	1	21
Dec. 2	„ Ditto ditto,	0	22
	Total, ..	2	3
		<hr/>	
		Seers.	Ch.
Nov. 8, 1837.	Dr. Huffnagle,	2	0
„	Mr. H. Cowie,	1	0
„	„ D. Hare,	1	0
„	„ T. S. Kelsall,	1	2
10	„ James Colquhoun,	0	2
„	„ Do. for Major Garstin, of Meerut,	0	2
„	„ W. Ainslie,	0	2
„	„ R. Campbell, for Capt. Malcolm,		
	Hydrabad,	0	2
„	„ Do. for Major Moore, Ditto,	0	2
11	„ W. Storm,	0	4

		Seers.	Ch.
Nov. 11, 1837.	Mr. J. P. Wise, Dacca,	0	2
"	" A. G. Glass, Do.....	0	2
14	" Ivison, Diamond Harbour,.....	1	0
"	Agril. Society of Berhampore,.....	4	0
15	Mr. D. McPherson,	0	2
"	" Rustomjee Cowasjee,	0	2
"	Agril. Society of Midnapore,	2	0
16	Ditto ditto, of Burdwan,	2	0
"	Ditto ditto, of Hoogly,	2	0
18	" Ditto ditto, of Beerbhoom,	2	0
20	Mr. C. Dearie,.....	0	4
21	" L. L. Rousseau,	0	4
24	" C. Bury, (Chittagong.)	0	8
25	" — MacDonald, (N. S. Wales,)	2	0
30	" Alexander Ronald, Tirhoot,	1	0
Dec. 5	Dr. A. Campbell, Nepal,	0	4
10	Capt. Sanders, for Major Gwatkin, ..	2	8
16	Mr. A. Beattie,	1	0
20	Dr. Wallich for distribution,	5	0
26	Mr. Simon Finch, (Tirhoot,)	1	0
28	" D. W. H. Speed, for Mr. W. Tan- ner of Monghyr,	2	0
Jan. 3, 1838.	Capt. Carter, for distribution at Azim- ghur,	4	0
4	Mr. Hart, for New S. Wales,	2	0
"	" Lock. Ditto,.....	2	0
"	Messrs. Willis & Earle for Mr. J. Finch of Tirhoot,	0	8
"	Ditto, for Mr. J. Mackay,	0	8
11	Mr. J. H. Haines, (Tirhoot,)	0	8
16	Dr. Wallich for distribution (2nd quota),	8	0
18	Mr. D. F. McLeod, (Seonee,)	0	8
28	Agril. Society of Assam,	1	0
Feb. 3	Mr. C. Trebeck for Capt. Leeson, ...	0	8
8	" W. Moran of Tirhoot,	1	0
"	" H. Walters, for a friend at Chitta- gong,	0	8
12	Capt. Roxburgh,	0	8
"	Mr. C. R. Prinsep,	0	0

			Seers.	Ch.
Feb.	16, 1838.	Dr. Maxton,	0	2
	20	Capt. H. I. Wood,	0	2
	"	Mr. Lock, (N. S. Wales,)	0	8
	23	" W. Ainslie, ..	0	2
	"	" John Donald, (Tirhoot,)	●	8
	28	Agril. Society of Midnapore,	1	0
March	2	Capt. Bogle, (Arracan,)	2	0
	6	Lt. C. Burnett, (Beaur, Mhairwarrah,) ..	0	8
	10	The Rev. T. Boaz,	0	4
	14	Mr. W. F. Gibbon,	0	8
	"	" W. Dent, (Shahabad,)	0	4
	15	" T. H. Gardiner, ...	0	4
	20	Sir H. Fane,	0	8
	25	Capt. W. Stewart, (Chunar,)	0	12
	29	Dr. A. Smith, (Hidgelee,)	0	8
	30	Col. L. R. Stacy, (Dacca,)	0	4
April	12	Mr. John Jenkins,	0	2
	"	" McKenzie, (Howrah,) ..	0	2
	19	" T. Brae,	0	2
	17	Agril. Society of Comillah,	0	6
	25	Mr. C. K. Robison,	0	4
	26	Raja Nursing Chunder Roy,	0	6
May	3	Lt. Burnett (Mhairwarrah) 2nd despatch,	0	4
	"	Mr. Thos. Palmer,	0	2
	"	Agril. Society of Burdwan,	0	6
	14	Dr. Strong for Mr. Brockman,	0	6
	16	Do. for a friend,	0	2
	"	Hon'ble Col. Rehling, (Tranquebar,) ..	0	4
	"	Mr. A. Mu ler,	0	4
	22	" T. H. Gardiner,	0	2
	"	" H. Fitzgerald, (Tirhoot,)	0	1
	23	" John Jenkins,	0	1
	"	Capt. H. Macfarquhar, (Favoy,) ..	0	4
	"	Mr. E. Wilkinson,	0	1
	24	" J. McLauchlin for Mr. F. Smyth, Di- napore,	0	4
	27	Dr. Maxwell,	0	4
June	5	Mr. F. P. Buller, (Shahajenpore,)	0	8

	Seers.	Ch.
June 16, 1838. Agril Society of Azimghur,	0	4
„ Mr. R. Montgomery, (Allahabad,)	1	0
„ „ G. H. Smith, Delhi,	0	6
„ „ A. Grant,	0	4
„ „ John Allan,	0	3
„ „ Ivison, (Diamond Harbour,) 2nd quota,	0	2
„ Agril. Society of Meerut,	0	4
	<hr/>	
Total, Maund	1 33	0
	<hr/>	
Total quantity received, maunds	2 3	0
Distributed to parties as above,	1 33	0
	<hr/>	
Quantity still in store, seers	10	0

JOHN BELL.

Calcutta, 20th June, 1838.

IX.—*On the wild Silk of Assam, Bhauglepore, Dinagepore, and Bancoorah.*

Report of the Silk Committee, on certain specimens of raw Silk and Cloth produced by the wild silk-worm in Assam, Bhauglepore, Dinagepore and Bancoorah, and presented to the Agricultural Society of India.

[Read March 14th, 1838.]

1st. A specimen of cloth made of silk, spun by the worm which feeds on the castor-oil plant at Dinagepore, forwarded by E. Bentall, Esq., in a letter to the Secretary, dated Oct. 16th, 1837.

2nd. A small parcel of the silk of the Moongah-worm fed on the mazanhurry plant in Assam; forwarded by Capt. F. Jenkins, in a letter to Dr. Wallich, dated Jan. 15th, 1838.

3rd. Three small skeins of Lussur silk, and a small piece of cloth made from such silk at Bancoorah; forwarded by D. F. McLeod, Esq., in a letter to the Secretary, dated 3rd February, 1838.

The Committee have carefully examined the specimens submitted to them for inspection and alluded to in the margin, and are of opinion that they are all very fair specimens of strong thread and cloth, exceedingly well calculated from their stout texture for native use.

The cloth appears to your Committee unsuited in its present rough and harsh state, for the home market; but the silk appears so good and even, that it seems only necessary to devise some

4th. Specimen of Bhau- plan of winding it off with a twist, so
 glepore Tussur silk, for- as to prevent that looseness of fibre,
 forwarded by James Pontet, as
 Esq., through T. A. Shaw, so remarkable in all these musters.
 Esq., without advice.

The Committee are unable to say more concerning these samples, as they have no data before them as to the cost, and would recommend that gentlemen, sending samples, should be invited to give minute details as to the cost of the raw material, the quantity of silk produced, the district which is the subject of their inquiry, &c.

The Committee beg to recommend that the several samples be forwarded to the Society of Arts, with a view to obtain the opinions of individuals at home, as to the quality and value of such silks and cloths in Europe, and that the Secretary be required to solicit any suggestions from that body, as to the possibility of improving the raw silk by a mode of reeling, better adapted to the nature of the material.

ROBT. WATSON,
 D. W. H. SPEED,
 WM. STORM,
 JOHN BELL.

Calcutta, 12th March, 1838.

X.—*On the successful introduction of the English Apple in Tirhoot. By JEFFREY FINCH, Esq.*

Communicated in a letter from Messrs. WILLIS and EARLE to the Secretary, dated 12th April, 1838.

[Read May 9th, 1838.]

We have the pleasure to send you a box, this moment received, containing four apples, grown from English grafts in the garden of Mr. Jeffrey Finch, of Shahpore Oondie, Tirhoot, which, at the request and on the part of that gentleman, we have the pleasure to present to the Society.

We regret that they did not arrive in time to be laid on the table at the Society's meeting of yesterday.

Memorandum by Mr. Finch.

For presentation to the Agricultural and Horticultural Society.

Four samples of Apples, produced from English grafts in Mr. Finch's garden in Tirhoot. March, 1838.

1 Apple, weighg.	25 sa. wt. measg.	in circum.	11 inches.
1 ditto, „	21 $\frac{1}{4}$	„	10 $\frac{1}{4}$ „
1 ditto, „	15	„	9 $\frac{1}{4}$ „
1 ditto, „	12 $\frac{1}{4}$	„	8 $\frac{1}{4}$ „
	73 $\frac{1}{4}$		39 $\frac{1}{4}$

Average alt. 10

One of the apples stated to be injured by insects.—W. & E.

Note by the Secretary.

These apples arrived a day too late to be presented before a general meeting; but I adopted what seemed to me the fairest way of allowing those who were curious to see them, by placing them in the hands of the Editor of the *Hurkaru*, who invited the public to inspect them. All who saw, and tasted the fruit, thought them equal in beauty and flavor to any they had tasted in England.—J. B.

The following statement since received from Mr. Finch, affords some interesting details.

[Read July 11th, 1838.]

No. 1. Graft planted in October, 1824, commenced to bear fruit as follows:—

1836 product	20 Apples.
1837 ditto,	70 ditto,
1838 ditto,	150 ditto,

Nos. 2 and 3. Grafts of 1826, produced fruit as below:

1836 product No. 2,	40	No. 3,	20
1837 ditto ditto	170	ditto	100
1838 ditto ditto	130	ditto	60

Nos. 4, 5, 6, and 7. Grafts of 1827, produced fruit as below :—

1837 product No, 4,	15	No. 5, 0	No. 6. 0	No. 7, 0
1838 ditto	150	8	8	5
1836 aggregate product of 3 trees	. . . .			80 apples.
1837 ditto ditto	of 4 ditto			355 ditto.
1838 ditto ditto	of 7 ditto			511 ditto.

The four specimens of apples sent down to the Society were taken from three trees, viz.

Specimen 1,	weighing	25	sa. wt.,	from tree No. 4.
Ditto 2,	ditto,	21½	ditto,	from ditto No. 1.
Ditto 3,	ditto,	15	ditto,	from ditto No. 2.
Ditto 4,	ditto,	12½	ditto,	from ditto No. 4.

From this it will be seen that the specimens were not solitary individuals but fruit taken out of a large product, the aggregate being upwards of 400 apples, and the general weight of the apples being from 8 to 16 sicca weight.

From the statement will also be seen the number of trees that bear fruit, with the product of each, how long it is since the grafts have been planted, and the time from which the trees have been in bearing. The soil on which the trees are planted, is that which is described by the natives as Soomb'ha Bat, a chalky soft clay with a small portion of sand, and having under the surface at the distance of about three feet a deep substratum of a soft whitish clay.

In the treatment of the trees I have found that pruning did not answer, such a process being rather against an early as also a good bearing, but it is essential that the false blossoms which come on in great abundance be always moved as they appear, and those only of the proper season, viz. of October and November, be allowed to remain on,—it is also requisite that the trees be carefully watched and kept clear of all kinds of insects; it is not necessary that the trees be shaded from the sun at any time, all I have been in the habit of doing is simply to have the trees well covered over with nets in the fruit season, to guard against the attacks of birds, as also to shelter them with *tatees* put up on two or three

sides, so that the fruit may not be damaged or knocked off by the violence of the northerly winds which prevail about that time. In other respects the trees are just treated as our other garden fruit trees.

Shahpore oondee Tirhoot, 5th June, 1838.

XI.—*Prize Silk, No. 1.*

The Gold Medal of the Society was awarded to W. G. ROSE, Esq., for the best samples of white and yellow Raw Silk; alluded to in the following communication.

[Read June 13th, 1838.]

To JOHN BELL, Esq.

Secretary to the Horticultural and Agricultural Society of India, Calcutta.

SIR,

With reference to the public notification of the Society offering Medals to the producers of the best staple products of British India, I send herewith a sample of Silk, consisting of one seer white and one seer yellow, reeled by me here, from the large Cocoon, March bund, and which I beg may be laid before the Society. It is contained in a box marked W. G. R.; the cocoons from which the silk is made, have been reared in a village quite close to this factory, and the cost of the article is Co.'s Rs. 13 per factory seer.

I shall be happy to furnish any further details required by the Society.

I am, &c.

WM. G. ROSE.

*Ramnaghur Factory near Coolbariah,
April 9th, 1838.*

Prize Silk, No. 2.

The Silver Medal of the Society was awarded to G. LAY, Esq., for the second best sample of yellow Raw Silk; referred to in the following communication.

[Read June 13th, 1838.]

To JOHN BELL, Esq.

*Secretary to the Agricultural and Horticultural Society,
Calcutta.*

SIR,

I am the Superintendent of Mr. Larruleta's Silk Filatures, late the Hon'ble Company's at this place, and having proposed to him to send the silk manufactured here to the Agricultural and Horticultural Society for competition for the gold and silver Medals, Mr. L. has answered me that he would be very happy and proud if he could show that no silk in India is better than his Jungypore silk; but as to the Medals he thinks that in the event of their being awarded to his Filatures, I ought to keep them as I have all the trouble with the spinners.

Accordingly I forward to you two parcels sealed the same as this letter, one containing 68 skeins white annual cocoon's Silk, weighing $2\frac{1}{4}$ seers, and the other 67 skeins yellow Silk of annual cocoons, weighing $2\frac{1}{4}$ seers. These two parcels being of different silks are intended for the competition of the Gold and Silver Medal; the yellow silk costs six annas per seer less than the white.

This season the bund of these Cocoons has been almost a total failure, so much so that our Filatures, four in number, will scarcely turn out 30 maunds against 150 maunds in a common bund. The drought destroyed four-fifths of the worms that died from bad and scanty food, and even those that lived to spin have done it so poorly that I may assert, without fear of contradiction from my neighbours, that we have not had one single good full cocoon, white or yellow, to work our silk of this bund.

No European in this district rears worms because he could not do it so cheap as the natives, who employ every member of the family in different objects; while the European would have to pay a salary however small for each branch in rearing, until the cocoons were removed for delivery in the Factory. It should also be recollected that a workman will never do his work with the same care, attention, and assiduity on a salary as when doing it on his own account.

In manufacturing the silk I have distributed to each cattanee or spinner daily 3 cahons, 7 pons, and 7 gundas of cocoons, the cost of which is 2 rupees, 7 annas, 9½ pies besides the manufacturing charges; and the produce from each cattanee is an average of 3 chattacs, 9 gundas, and 3 kogs per diem. In order to make this subject more intelligible to persons unacquainted with the manufacture of silk, I annex a statement which will shew the quantity of cocoons employed, and all the expenses incurred in the manufacture of one seer of silk. You will observe, that we do not include in it the expense of the native establishment, and it is proper to explain the reason. There is a great quantity of chussum removed from every cocoon before spinning silk; and besides there is the Toppah, Malbandnah and Fasnah, which articles sold at the Factory pay entirely all our native establishment and something more, consequently it would be unfair to add any thing but what we pay for spinning, including the wear and tear of implements.

The price of this silk is very high, but had we not purchased the cocoons, others would have done so, and even at this rate, we have only had a small share. Respecting the charges, I will grant that other Filatures may have them lighter; but when the silks go before those severe judges the English manufacturers and their brokers, they find this Factory's silk clear, well reeled, mellow and even, and purchase it freely in running numbers 25 and 50 bales at the time; while other silks are found harsh, uneven, endy, and other, etceteras, which induce them to pay 3s. per lb. less than ours, and consequently four or five annas per seer saved

here in the expenses are lost by the 3s. per lb. lower prices in London.

I have the honor, &c.

GEORGE LAY.

Jungypore, 25th April, 1835.

Statement of the cost of a seer of white Silk from the annual Cocoons, including materials, labor, and wear and tear of implements in March and April, 1838: viz.

17 seers, 12½ chatacks of cocoons, at 25-14 per maund,	Co.'s Rs.	11	8	0	
4½ Cattanees and Jogaldars, at 8-4 per month both,.....		1	4	4	
4½ Watermen, who provide water every day, for 8 ghyes, each at 3-12 per month,		0	1	2	
1 Maund, 34 seers of dry firewood which costs when green at 14 Rs. for 100 mds. and stands dry at 15-10,		0	4	8	
Coolies for baking the cocoons and exposing them in the sun, &c., wear and tear of implements including reels, and stands, baskets, &c.,		0	2	10	
Total manufacturing charges,			1	13	0
Cost of 1 seer white silk,..	Co.'s Rs.	13	5	0	

N. B. The seer of yellow cocoon's silk, costs exactly 6 annas less than the white.—G. L.

*Committee's Report on the foregoing Samples of Raw Silk.**

[Read and confirmed June 13th, 1838.]

At a Meeting of the Silk Committee, assembled at the Town Hall on Wednesday evening the 16th May, 1838.

PRESENT.

R. Watson, Esq., in the chair.

Messrs. W. Storm.

„ D. W. H. Speed.

„ G. T. F. Speed.

Dewan Ramcomul Sen, and.

John Bell.

Four parcels of raw silk were submitted, viz.

One parcel from Mr. Rose of Ramnaghur factory, consisting of one seer white, and one seer yellow silk.

Two parcels from Mr. Lay, superintendent of Mr. Larruleta's silk filatures at Jungypore; one consisting of 68 skeins weighing $2\frac{1}{4}$ seers of white, and the other of 67 skeins weighing $2\frac{1}{4}$ seers of yellow silk.

One parcel from Mr. A. Macarthur of Bamundee factory, Zillah Nuddeah, consisting of about four seers of yellow silk.

The committee are of opinion, that Mr. Rose's samples are the best, and entitle that gentleman to the Society's gold medal.

That Mr. Lay's sample of yellow silk is the second best, and entitles that gentleman to the silver medal of the Society.

Resolved, that the Secretary be requested to send a few skeins of each of the prize specimens of silk, to Mr. W. Prinsep, soliciting that gentleman's opinion as to the present price of such samples in this market.

Resolved, that half the quantities sent in by successful candidates be returned, and that the whole of Mr. Macarthur's samples be returned.

R. WATSON.

W. STORM.

RAMCOMUL SEN.

D. W. H. SPEED.

G. T. F. SPEED.

JOHN BELL.

Addendum.

With reference to the opinion offered by Mr. W. Prinsep since the foregoing report was agreed upon, the committee have subjected the skeins to a more careful scrutiny, and see no occasion to alter the opinion exhibited in their report.

R. WATSON.

W. STORM.

G. T. F. SPEED.

D. W. H. SPEED.

RAMCOMUL SEN.

JOHN BELL.

Town Hall, May 29, 1838.

XII.—*Sugar sent in to compete for the prizes.*

Committee's report on the only sample submitted for competition.

[Read and confirmed June 13th, 1838.]

At a meeting of the Sugar committee convened on Thursday the 17th May 1838, for the purpose of reporting upon samples of sugar sent in for competition, agreeably to advertisement, and in accordance with a resolution passed at a General Meeting on 9th May, 1838.

PRESENT.

A. Colvin, Esq., in the chair.

Messrs. A. Muller.

„ G. U. Adam.

„ W. Storm.

„ John Bell.

Read a letter from Mr. Blake, dated Dhoba —, received April 21st, 1838.

Read the conditions under which the gold and silver medals are to be awarded for such samples.

No sample except Mr. Blake's having been submitted to the committee,—

They are of opinion that the sample before them does not come within the meaning of the Society's intentions, as expressed in the printed conditions, the sugar in question having been made from goor by a double process and not by a single boiling, as practised in the West Indies; neither has Mr. Blake conformed to the conditions as to the information required, concerning cultivation and other essential particulars.

* With a view to prevent misundertaking the committee would beg to suggest that a more specific advertisement be published, confining the intention of the Society to Muscovado sugar, boiled direct from the cane within 24 hours after being cut.

The committee further recommend that the Society be directed to give notice to all known cultivators by circular,

in addition to the advertisement which may appear in the public prints.

The committee consider it too late in the season to keep the offer open for the present season, and would suggest that the 1st May 1839, be fixed for the show of samples.

ALEX. COLVIN.

A. MULLER.

G. U. ADAM.

W. STORM.

JOHN BELL.

XIII.—*On the Lac Insect and mode of cultivating it.* By Major SLEEMAN. Communicated in a letter dated May 7th 1838.

[Read 13th June, 1838.]

When at Mirzapore on my way down from the hills in November last, I visited Mr. Barlow's manufactory of Lac dye at that place, and was much surprised to find that none of the gentlemen who superintend it were aware of the fact, that lac is as much *cultivated* as any other raw material for manufactory; that is, that the insect is *put* upon the trees upon which it is found to thrive best; and that the quality, and consequently, price in the market, varies with the kind of the tree from which it is taken.

The lac is gathered twice a year, the best crop is in April from seed applied to the trees in October, the second, which is inferior, in November.

The tree that yields the best lac is one common to the jungles in this part of India, and called

1st. Kosum or Asun*. The produce from this tree is said to be much superior in quality to that from any other tree.

* *Schleichera trijuga* of Willd. Roxburgh's *Flora Indica* 2. p. 277. Wight and Arnott's *Prodr.* 1. p. 114. *Cassumbium* of Rumph and Hamilton belong to this genus, the Malayan name of one of the species being, according to the former *Cussambi*.—N. W.

2nd. The dhak, the *Butea Frondosa* of Botanists, common to all parts of India.

3rd. The Tinsa.

4th. The Gothur or Ghont.

5th. The Peepul. *Ficus religiosa*, common to all parts of India.

6th. The Beree or Beer, the *Tizyphus jujuba* of Botanists.

7th. Also the Ramna.

The people leave sufficient seed for the next crop upon the trees from which they gather ; and they do not consider the produce to deteriorate from the same seed being left long upon the same tree.

They apply the seed to the fresh tree either in June, for the November crop ; or in October for the April crop. Their mode of doing it is to cut off the branch of an old tree with the insects upon it ; and to place this branch upon a branch of the fresh tree, over all the branches of which the little insects soon spread themselves.

I have asked the people whether the trees ever require a fallow or not, and have been told that they do not.

A Gond cultivator of the lac from the pergunna of Sehora tells me, that they begin to cut on the 18th of Bysak (or the 28th of April) and continue to cut through the two succeeding months of Jeth and Asar (May and June). In the beginning of Sawun (July) the insects begin to quit their *combs* ; and it is useless any longer to cut, as the substance yields no longer any colouring matter for the merchant, or seed for the cultivator.

They begin to cut again in October, eight days before the dewallee, or new moon of Katick ; and continue to cut for sixteen days, till eight days after the dewallee. After this time the insects come out of the *comb*, and make off ; and before the commencement of these sixteen days the substance is not considered to be ripe.

They place the small twig containing the seed between two branches of the fresh tree, thus ∇ so that each end of it may be flat upon the branch on which it rests ; if either

of the ends of the twig project beyond the branch Ψ , the insects will not quit it to ascend upon the branch, but after walking forward and back a few times die: about one half of the insects upon the twig would in this way be lost. If both ends projected the whole would perish upon those parts that projected, though the twig should touch both branches. They cannot tie the twig on to the branches with cords, for when they do so the insects walk round and round upon the cord till they die; great care is, in consequence necessary to replace the twigs whenever they get deranged by the wind or rain.

This Gond tells me, that though they cut twice a year they sow only once; and that in Katick (October). During sixteen days of this month half the cultivator's family is employed in gathering the produce, and half in applying seed to other trees. They must always leave a small portion of every branch they cut off for seed; and when they do not do so the people to whom the trees belong complain of injury. Commonly the proprietor of the trees and the cultivators are one and the same; but sometimes they are different, those who plant and gather renting the trees from the proprietor at so much the tree, the score, or the hundred; or so much the acre for the lands on which they grow. They again contract with the merchants who make advances to them. This season (April 1838) the merchants of Jubulpore have contracted at seven rupees the maund; three or even two years ago they contracted at the rate of fourteen the maund for lac of the same quality. The produce gathered in Katick is called Katickee; and that gathered in Bysak is called Bysakee. This Gond and another equally *learned* whom I have consulted, tells me, that the same seed is left on the tree, and the produce never deteriorated as long as the tree retains its vigour, which it does for a man's life almost. They never allow any person to touch the roots of the trees from which they take lac; as it would injure them. The roots of the dhak trees that are not required for lac, are dug up and used for ropes.

One tree is, they say, enough to supply a whole forest when the trees are near to each other without the necessity of cutting branches from one to apply to another ; as the insects, as they fall from the branches of one tree, are taken up by the lower branches of its neighbour.

The Kosum tree, on which the best lac is produced, has never yet, I am told, been cultivated, or, if I may use the term, domesticated ; though it abounds in the forests of this part of India. The insects of the produce from this tree yields colouring matter superior to those of the produce from any other tree ; but the great superiority of the produce from this tree over that from any other is in the matrix or gum in which the insects lie imbedded, as bees in their comb. This gum is of much finer quality for manufacture than that from any other tree ; and what is of great importance to merchants and manufacturers, it will not only remain itself unimpaired in stove-rooms for ten years, but retain the insects or colouring matter uninjured for that time, while the gum from the best of the other trees cannot be kept with safety for more than two years. The produce from the other trees is so very brittle that it is broken up and separated from the wood even the first season, before exported from the district in which it grows ; but the produce from the Kosum is so firm and compact, that the comb or nidus could not be separated from the wood without destroying the insects or colouring matter ; and the whole of the wood covered with the substance must be exported with it. A maund of this produce may sell in the market at the same rate as that from any other tree, merely because there may be a much greater portion of wood, which is of no value.

There are immense groves of dhak trees, within a few miles from Jubulpore, appropriated exclusively to the production of lac. In some cases the proprietor of the land cultivates the lac and sells it to the merchant exporter himself ; while in others he lets his trees at so much a hundred to others who earn a livelihood by the cultivation.

The natives remark as a peculiarity which distinguishes the Kosum from every other tree, that every twig has six leaves ; neither more nor less. It is certainly the case with the Kosum, but whether it is with any other tree I know not. I do not think it is with any other tree that I have seen : I enclose a specimen of the twig from the Jubulpore jungles.

I think that in the produce from the Kosum tree, the gum, or nidus, bears a larger proportion to the insects, or colouring matter, than in that from any other tree ; another reason why the raw produce from this tree may not fetch a higher rate of price in the market, though each of the two component parts is admitted to be of a quality so much superior ; because the gum is an article of much less value, compared with its weight, than the insects.

W. H. SLEEMAN.

(Note by Professor ROYLE on the same subject.)

*On the " Dhak" or " Palasa" tree (" Butea frondosa")
and on the " Butea frondosa superba."*

At a Meeting of the Royal Asiatic Society, held on 3rd of March, 1838.

" Professor Royle read to the meeting a paper on some astringent substances which are abundant in India, and which might be worthy the attention of persons in England. As a preliminary, it would be necessary that these substances, to be valuable as articles of commerce, should be cheap, compact and abundant. The ' Dhak' or ' Palasa' (' Butea frondosa') was found useful as wood for fuel ;—its flowers produced a dye, and from its stem a powerfully astringent gum exuded, which was used in the arts and in medicine. Dr. Roxburgh had mentioned the tree, and had observed that the lac insect was often found upon its branches, so that the same workman who gathered the productions of the tree might also collect the lac. Dr. Roxburgh states that a red juice hardening into a gum, exudes from fissures.

in the 'Butea frondosa superba,' which is strongly and simply astringent. The substance, Professor Royle said, was used in the north of India, and was called by the natives 'Kumur Kus,' also 'Dhakke-gond' and 'Kueni.' It had been lately brought to England by Mr. Bechell, with the idea of trying to make it useful as an article of commerce.—The Professor stated that in his opinion this was not a new importation into Europe ; he had sent some of it to Mr. Pereira, who recognised it as being the 'Gummi rubrum astringes' of the old druggists. Specimens of both these substances were laid upon the table, and they were seen to be identical. M. Guibourt, of Paris, to whom some of it had been sent, states his opinion in his work on drugs, that it is the original 'Kino,' which had entirely disappeared from commerce, and was once so much valued as to be sold for nearly a guinea a pound. This must, however, remain doubtful, as none of the original 'Kino,' introduced by Dr. Fothergill, was now known to exist, though there was strong presumption of the fact by the resemblance of the Hindu word 'Kuenee' and the European name 'Kino.' There can be no doubt that it was at least one of the earliest substitutes for 'Kino,' and had there existed a museum for Indian useful products it would most probably have continued to this day, and have been imported exclusively, instead of being replaced by substitutes from New Holland, Jamaica, and other parts of the world."

XIV.—*On the culture of the Cocoanut tree in Ceylon.*

Communicated in a letter to the Secretary from the Rev. Mr.

C. E. DRIBERG, dated 9th May, stating that he obtained the information from a friend in Ceylon.

[Read June 13th, 1838.]

1. Cocoanut plants are usually raised in beds from seed, though some prefer planting them at once in the place in which they are to remain afterwards. In the latter case,

however, it often happens that before the shoots penetrate the husk they are eaten up and destroyed by white ants, and thereby gaps are made among the rows to be again filled up by other plants; to avoid all this trouble, the method of transplanting is always adopted by extensive planters, and this method is attended with a further advantage that it assists in rearing up the plants all of the same age and size.

2. The plants may be transplanted about six or eight months after the nuts have been put into the nursery, that is to say, when the plants have put forth three or four leaves in Ceylon: they are generally transplanted in May, that being a rainy month.

3. Manure is not added to the hole in which the young trees are planted as it breeds white ants, the enemies of the cocoanut plants, although in soils entirely free from them manure may no doubt be added with advantage.

4. The trees should be planted at the distance of six yards from each other.

5. The subsequent culture of the plant is continually to examine and clear it of white ants, for which purpose the earth accumulating near the root must be always removed. The plants are neither manured nor watered by Ceylon cultivators, though during the dry season in Bengal watering will certainly do them good. And manuring may be advantageously used, care being always taken to keep the white ants off. The more the ground is kept clear and free from weeds the better. Paddy and such other grains may be sown in the cocoanut plantation, the preparation which the ground undergoes by the plough for this purpose serves much to improve the plants, other fruit trees are commonly planted in cocoanut groves, but it is well known that the cocoa thrives best without them.

6. Betel-nut trees are frequently raised among cocoas by the poorer classes of people, with whom it is an object to have something of every sort in their small gardens; but it would be better not to do so.

7. It would benefit the cocoanut plants much were a cashu, mangoe, or some such shady trec planted in the centre between every four holes, but these trees must be all cut down when the cocoas begin to cast off their boughs, which they generally begin to do when they are about three or four years old. After this they require no more care from man.

8. The best sort of cocoanuts are those of a middle size, having a very thick and hard pulp of a transparent whiteness, these being known to produce the greatest quantity of oil.

9. In the very best soils the cocoanut tree has been known to bear fruit in three years. But the term of bearing fruit will vary according to the nature of the soil from three to eight years.

10. The hole in which the young cocoanut is to be transplanted must be knee-deep, and a cubit and a half in diameter, and must be filled gradually as the plant grows up.

11. The nut for seed should be gathered before the husk is quite dry.

XV.—*Successful plan of cultivating the Grape Vine, by Mrs. Captain MILNER of Goosree. Communicated to the Society by Dr. Wallich in a letter to the Secretary, dated 13th June, 1838.*

[Read June 13th, 1838.]

The following is an extract from a note from Mrs. Capt. Milner which accompanied some extremely beautiful and perfect branches of grapes which I am to present to the Society's meeting to-day.

“ You were right in supposing the pale green grape to be the Muscatel. The purple cannot I imagine be the ‘ blue Hambro’ as it is a *cluster grape*, and only attains its present perfection by being constantly thinned with a fine pair of scissars, when the fruit has formed. These vines together with another fine sort, like the Portugal grape, the

fruit of which I am sorry to say is not sufficiently advanced to enable me to send a specimen, were brought from the Cape about seven years ago, and were planted in a sheltered alley between two high godowns where they have flourished surprizingly well. The purple vine is the more hardy, and produces much more abundantly than the muscatel. Our largest purple vine could scarcely have had less than a hundred branches of grapes upon it this year. About the beginning of January the vines are removed from their trellices and extended on the earth, all the remaining leaves stripped off, and the branches *effectually* preserved; the roots laid open, superfluous fibres cut away and a portion of the bark of the main stem of the vine removed,—scraped off with a knife,—the whole length of the stem. After being suffered to remain a month in this state the roots are covered with fine fresh earth mixed with a little surkee and vegetable manure. We increase the richness of the soil by *burying fish* (covered with oil-cake to prevent vermin), at about half a yard distance from the root of each vine. Four pounds of fish for each vine will be sufficient.”

I must not omit to tell you that vines had been planted in various situations in this garden, and every possible means adopted to ensure their growth, but entirely without success until it occurred to Mrs. Milner to try the plan adopted at Pondicherry; and much to our amusement the alley before mentioned was cleared and the result you have now before you. Was it not a happy discovery?

I am sure you will be delighted to see the specimens of grapes. They are so beautiful; and the plain and clear statement of Mrs. Milner's mode of treating her vines will likewise, I am sure be interesting to you and the Society.

XVI.—*Sugar-cane grown in the Soonderbuns by A. G. HARRIS, Esq. shewing a remarkable improvement on the original stock, as communicated in the following letter from that gentleman to the Secretary, dated 24th May.*

[Read 13th June, 1838.]

I send the specimen of Sugar-cane I shewed you this morning: I find the cane was planted in the beginning of last July, from some stocks of a most inferior description procured from a native in Intally; none of the stocks ran more in diameter than a common ratan about the end of September, the greater part of the first plants were cut down the stocks being left, the large cane is a ratoon from those stocks, the three smaller canes the first produce of the plants, the cane having so very much improved. I shall feel obliged if you can kindly procure me as much information on this sample as to its capability of further improvement and the likelihood of its turning out to advantage in a cultivation of any extent, as I have a large quantity of plants ready; the appearance of the cane while growing is very beautiful,—a very broad and feathery leaf not so long as the Otahetian, of a much darker green, the plants throw up a vast number of canes and is of a much hardier nature than the common cane, and grows from seven to ten feet high: the above specimen was grown in the garden soil on higher land in the Soonderbuns; no very particular care or attention has been paid to its culture.

Opinion of J. GUILDING, Esq., on the Sugar-canes alluded to in the preceding communication, in a letter to the Secretary.

[Read June 13th, 1838.]

I received your favor of yesterday's date enclosing a letter from Mr. Harris and accompanied by a parcel of sugar-canes grown on his lands in the Soonderbuns. I must confess I am rather astonished at the statement he makes

relative to their growth, such a wonderful improvement in so short a time in the size of the cane surpasses any thing I have before witnessed, more especially the enlargement of the ratoon to three or four times that of the plant is quite contrary to our order of things in the west:—it must therefore be satisfactory to Mr. Harris to have ascertained these two essential points, that his lands must be favorable to cane cultivation, and that he possesses a species of cane well suited to the climate and localities of those lands. I have always been of opinion that the rich alluvial flats of the Soonderbuns (so nearly resembling the lands of Guiana), may be made equally profitable if drained and laid out as the plantations are in those parts, and these at present immense wastes may then grow sugar enough for the consumption of the world. No sugar plantation can be sufficiently profitable unless a proper system of cropping is established by ratooning the canes as long as they give a fair return, by which means the sugar is of a much better quality, the labor and expenses are considerably reduced, and the crop is almost certain and may be taken off at any time of the year as circumstances suit and they become ripe. I have known ratoons in Demerara of 30 years' standing giving an annual average of two tons per acre. Mr. Harris having now found that his ratoons are better than his plants, may perhaps be induced to continue them as long as possible.

The growth of the cane in this country surpasses any thing of the kind with us in the west. Mr. Harris states that his first canes were planted in July, and cut in September following, and I find by the general system of cultivating the cane in this part of the world, the same are cut as nine or ten months plants, long however before they are ripe, although fully grown; in the west we give our flat lands at least 14 months to ripen plants, although we cut our ratoons according to circumstances from eight to twelve months old. I have cultivated at sundry times upwards of a dozen varieties of the cane, and although the Otaheite is certainly entitled to the head of the list, yet there are certain soils, cli-

mates, localities and other circumstances that render the cultivation of the other varieties occasionally more profitable. I would therefore recommend any person cultivating sugar to use that species best suited to his particular circumstances. In good *open* land that can be irrigated I should give the preference to the Otaheite; in lands that suffer from droughts I would plant the striped or gingham variety, and on low wet lands I think the species at present possessed by Mr. Harris as best suited, and I should advise him to persevere in its propagation as doubtless it will *continue* to improve with a little care and attention.

XVII.—*Plough made at Porto Novo from an American model.*

Report of Mr. HARRIS, on a trial made by that gentleman on his Soonderbund lands.

[Read 13th June, 1838]

As I have returned the Society's plough I beg to send you my remarks upon the same.

I found the plough much too heavy for two common Bengalee bullocks, but could be managed with two buffaloes with ease and satisfaction; having none, I was not able to judge from trial: the common cattle would only go a few furrows and then lie down. The plough turned the ground up about 4 inches deep; four head would manage the plough well, after having been properly trained; then even it would not be used by any of the natives, they not being able to afford such a number of cattle and men as the instrument requires; I think there might be some alterations made in it that would adapt it for general use, but in its present state it is unavailable for that purpose.

I tried it in lands high, hard and dry, soft and low, light but dry soil; the plough worked best in the first, threw up better furrows and the cattle did not labour so much at it. The plough not answering for low soils, in which part it would be in most requisition, would debar the natives from using it: in fact I could dig up land with the hoe much cheaper than I could plough it with such an article.

Calcutta, May 28, 1838.

XVIII.—*A receipt for preventing the ravages of white-ants on a Sugar-cane Plantation.*

Take the following ingredients :

Asafoetida, (hing,) 8 chittacks.

Mustard seed cake, (sarsun kí khalli,) 8 seers.

Putrid fish, 4 seers.

Bruised butch root, 2 seers ; or muddur, 2 seers.

Mix the above together in a large vessel with water sufficient to make them into the thickness of curds ; then steep each slip of cane in it for half an hour before planting, and, lastly, water the lines three times previous to setting the cane, by irrigating the watercourse with water mixed up with bruised butch root, or muddur, if the former be not procurable.

Note.—The above recipe was furnished to Capt. Burnett of the Mhairwarrah Local Battalion by Capt. W. Burnett, of the 53rd Regt. N. I. and received from the former gentleman for the use of the Agricultural Society in a letter to the Secretary, dated Beaur, June 8th, 1838.

XIX.—*Mode of Preserving Silkworm's eggs.*

[Extract from "Galignani's Messenger" of the 4th January, 1838.]

"Some silkworm's eggs, brought from Bengal by Monsr. Gaudichaud in the "Bonite" on her return from circumnavigating the world, were examined a few days ago by order of the minister of the marine, by Professor Andonin, in the presence of Monsr. Camille Beauvais and several persons interested in the result, and were found to be in a perfect state of preservation. It has hitherto been deemed extremely difficult, if not impossible, to bring silkworms' eggs across the line, as they are generally hatched when brought into the temperature of 20° of Reaumur, or 77° of Fahrenheit. The eggs in question were preserved, some in alternate rolls of tinfoil and thick paper, others in a bottle. A very few eggs had been hatched, but they bore no proportion to the total number."

XX.—*Artichokes.*

Mode followed by NATHANIEL ALEXANDER, *Esq. in the cultivation of Artichokes.*

[Read June 9th, 1838.]

The plot of ground intended for the plants should be well manured before the commencement of the rains, unless the soil is very rich, which is rarely the case in Bengal. The best manure I find to be one-third of the rubbish from a house doing up, which consists of lime and brickdust, and two-thirds of cowdung, thret or four years old : to be got from any cowkeeper. These made into a compost should be spread four inches thick on the surface of the ground and dug in before the rains commence ; during the rains the ground to be kept free of weeds, and if it becomes sufficiently dry a second digging is useful to mix the manure thoroughly. After the rains and until the plants are put into the ground it should be dug again once or twice.

I find the plant raised from the country seed answer best. The seed is sown in a bed protected from the rain in July or August, and in about a month after it comes up : it should be transplanted into a larger bed still protected from the heavy rain. In the beginning of October it should be again removed a second time, and may be put out into the garden and remain until it is finally planted in the plot of ground prepared for it. About 1st December poles two feet apart and eight inches deep should be dug in the plot : about two to three inches of cowdung (old) should be put at the bottom of each hole, and then the earth filled in within an inch of the surface ; a plant should be placed in each hole, and watered sparingly until it has taken root : after this and during the cold season the plant should not be forced forward but merely kept vegetating until the weather changes about the middle of February. I then open round each plant a couple of inches deep and fill up with cowdung and commence watering daily. The plant then suddenly shoots up and by

1st March it should be watered morning and evening : by the middle of the month the plant bears.

The object of this process is to hinder the gradual growth of the plant, which in that case exhausts itself in leaves.

The success of the experiment depends entirely on the richness of the soil ; unless it is sufficiently so to force forward, with the aid of water, the fruit before the leaves increase and exhaust the plant, there is no chance of the gardener having a good crop of artichokes.

26th April, 1838.

XXI.—*Culture of the Vine.*

Queries put by the Secretary. Replies by J. M. MACKIE, Esq., of Dinapore, 1838.

1st. How the plant (vine) should be situated ? It should face north and south, or in a line east and west to have the sun's action all day.

2nd. How trained ? To be planted 5 to 6 feet from each other, in a row, and in a parallel line 8 feet opposite, and the shoots trained in a serpentine order upon it.

3rd. At what season pruned ? In Calcutta I should recommend pruning in the middle of January as the spring sets in in Bengal earlier, we never do it here till the middle of February.

4th. How pruned ? This is a careful operation and should be nicely managed and performed, choosing the best, strongest, and vigorous

shoots, and leaving thereon as many plump eyes as may be found, and lopping it off in a sloping direction and scraping the wood carefully of its decayed bark without injuring the eyes.

- 5th. When the blossom sets? It will set (I imagine) in Bengal early in February, or soon after the pruning is performed: it blossoms here at the end of February.
- 6th. When the fruit ripens? It ripens early in June or at the end of May.
- 7th. How many crops in one year? Only one crop.
- 8th. What sort of soil to be chosen? A dry, high, light soil, well manured with a rich vegetable mould, adding to it some rotten fish and a portion of coarse pounded brick bats; and if a thin layer of coah were to be laid at the bottom of the vine roots at the time of planting them out, would I think be advisable, as the soil of the gardens in Calcutta is too moist for the grape vines, and would recommend this method.
- 9th and 10th. If to be irrigated and how? If the vine is old enough to bear fruit no water is to be given to it, until it is pruned and the root well manured in January, when a slight irrigation may be necessary to assist blossom, but if too

much, a vigorous production of leaves may be the result, and not a single blossom, but when it is fruited, watering should be given when found necessary.

Hoare's treatment of the Vine in Europe recommended for adoption in India. By W. STORR, Esq.

[Read 12th September, 1838.]

I have the pleasure of sending you an extract from a valuable work on the Grape Vine by Clement Hoare.

The publication of it in the Society's Transactions will enable every person who possesses facilities for the growing of grapes, to employ them in the most advantageous manner, in the production of this highly esteemed fruit.

The mode of culture recommended by Mr. Hoare, offers to the possessors of houses, buildings, gardens, compounds, and even to the most humble cottager, ample means of procuring with the greatest certainty, an abundant supply of this most valuable fruit.

The vines recommended by Mr. Hoare for cultivation are the—

- 1 Black Hamburgh.
- 2 Black Prince.
- 3 Esperione.
- 4 Black Muscadine.
- 5 Miller's Burgundy.
- 6 Claret Grape.
- 7 Black Frontignan.
- 8 White ditto.
- 9 Grizzly ditto.
- 10 White Muscadine.
- 11 Malmsey, ditto.
- 12 White Sweetwater.

The mode of cultivation recommended is so simple and easy that I hope to see in a short time every house in Calcutta with its vine tree and grapes as plentiful as mangoes are.

▪ *Extract from "A practical treatise on the cultivation of the Grape Vine, by Clement Hoare."*

“The native country of the Vine, is generally considered to be Persia, but it has been found wild in América, and is now become naturalized in all the temperate regions of the world. In the Northern Hemisphere, it forms an important branch of rural economy from the 21st to the 51st parallels of latitude.

“The grand parent error which prevails universally in the cultivation of the vine, lies in the method of pruning usually adopted, and this is, undoubtedly, the consequence of the nature of the plant and its peculiar characteristics being, in general, but little understood. The immense quantity of wood which a vine annually produces, and the force with which its sap flows, causing its most vigorous shoots to be formed at the extremities, render it necessary, in order to keep the plant in good bearing condition, and its branches within a reasonable distance of its stem, that the pruning knife should be used to a far greater extent, than is ever practised on any other description of fruit tree whatever. The most severe manner, indeed, in which that instrument is at any time applied to other trees, is as nothing when compared with that required by the vine.

“In the course of the growing season, a vine in a healthy condition will make a quantity of bearing wood sufficient to produce ten times as much fruit as it can bring to maturity. When this fact is considered in connexion with another; namely, that the wood which bears fruit one year, never bears any afterwards, and therefore is of no further use in that respect; it will easily be seen to what a surprising extent the pruning knife must be used, to get rid of the superabundant wood which the plant annually produces.

But nine parts out of ten of the current year's shoots, and all those of the preceding year, if possible, to be cut off and thrown away, is apparently so much beyond all reasonable proportion, and the rules usually observed in pruning other fruit trees, that few persons ever possess the courage to attempt it.

“A vine in the third or fourth year of its growth, will in general shew a few branches of grapes, and these are usually suffered to remain and ripen, instead of being plucked off as soon as they appear, having been produced before the plant has sufficient strength to mature them without injury to its constitution.

“Scale of the greatest quantity of grapes, which any vine can perfectly mature, in proportion to the circumference of its stem, measured above the ground.

cir.	lbs.	cir.	lbs.
3 inches	5	7 inches	45
3½	10	7½	50
4	15	8	55
4½	20	8½	60
5	25	9	65
5½	30	9½	70
6	35	10	75
6½	40	10½	80

“It will be seen, that if 2½ inches be deducted from the circumference of the stem of any vine, the capability will be equal to the maturation of ten pounds of grapes for every remaining inch of girt. The proportionate quantity for fractional parts of an inch may be easily calculated.

“No vine is taken cognizance of until its stem measures three inches in girt, as, under that size vines ought never to be suffered to ripen any fruit.

“The manner in which it is intended that this scale should be applied, is to measure the stem of a vine at the autumnal pruning, and to retain no more good well-ripened fruit buds, than is supposed necessary to produce the given weight of fruit that corresponds to its girt; and I consider

every bud rejecting the two bottom ones on each shoot as equal to the production of half a pound weight of fruit."

On Soil.

"The natural soil which is most congenial to the growth of the vine, is a light rich sandy loam, not more than eighteen inches in depth, on a dry bottom of gravel stones, or rocks.

"No sub-soil can possess too great a quantity of these materials for the roots of the vine, which run with eagerness into all the clefts, crevices, and openings, in which such soils abound.

"One of the principal causes of grapes not ripening, is the great depth of *mould* in which the roots of vines are suffered to run, which, enticing them to penetrate in search of food below the influence of the sun's rays, supplies them with too great a quantity of moisture.

"To prevent this, the sub-soil should be composed of dry materials. It is almost impossible indeed to make a vine border of materials that shall be too dry or porous. It is not mere earth that the roots require to come in contact with, to induce growth and extension, but air also, which is as necessary to them, as the leaves and branches.

"All borders, therefore, made expressly for the reception of vines, ought to be composed of a sufficient quantity of dry materials, such as stones, brick-bats, broken pottery, oyster shells, &c. &c., to enable the roots to extend themselves freely in their search after food and nourishment; to keep them dry and warm by the free admission of air and solar heat; and to admit of heavy rains passing quickly through, without being retained sufficiently long, to saturate the roots, and thereby injure their tender extremities."

On Manure.

"Of those manures, therefore, that may be mixed with the soil when the border is first made, the best are such as possess the two valuable qualities of affording to the roots of the vine *the highest degree of nourishment*, combined with *the greatest permanency of duration*. Of this descrip-

tion are bones, horns and hoofs of cattle, bone-dust, the entire carcasses of animals, cuttings of leather, woollen rags, feathers and hair."

On the pruning of Vines.

"The chief object in pruning a vine, is to increase its fertility; which is effected by cutting out the superabundant wood which it annually produces, and adjusting the number and length of the branches that are to remain, to the capacity of the plant for the maturation of its next crop of fruit, and for the production of future bearing wood. The necessity for this operation will appear evident when it is considered; firstly, that the shoots of a vine which bear fruit one year, never bear any afterwards; secondly, that those parts of the shoots that grow in the latter part of the summer, are not sufficiently ripened to produce fruit; thirdly, that a great number of shoots, including those that push from the bases of the buds, and which are thence called lateral or side shoots, are too small, and otherwise unfit to produce fruit; and fourthly, that a vine in vigorous growth and under judicious management, will annually produce a much greater number of buds, that would bear fruit in the following years, if retained, than it can possibly bring to perfection."

Winter training.

"When the shoots are trained in the early part of the year those which are trained at full length as fruit-bearers, are in all cases, to be cut down to the lowermost bud or two at the next autumnal pruning. With respect to all such shoots, no greater supply of sap should be permitted to flow into them, than is necessary to mature their fruit. For example, if the shoots 1, 2, 3, 4 (see fig. 3) were trained in straight lines, the sap would ascend with such force, that many of the lowermost buds would scarcely break at all, the sap passing by them, and accumulating in those at the upper parts of the shoots, which would burst with great force, and form very strong shoots; these would rob all the fruit on those below of its due share of nourishment, and also the shoots emitted from the spurs D; which to form

good bearing wood, require as great a supply as the fruiting shoots.

“ In training the shoots 1, 2, 3, 4, the space between them must be regulated by the number of shoots intended to be trained up from the spurs D; each of these latter will require five inches of clear space on each side of it, and the former, nine, for the fruiting shoots.

“ The best time of the year to transplant a vine, is immediately after the fall of the leaf; the longer its removal is postponed after this period, the later in the ensuing spring does it begin to vegetate: cut the vine down to the two bottom buds.

“ *2nd year.*—May 1 England; (Feb. or March India.) Now, remember, that only a single shoot is permanently to be trained throughout the summer, the object of having two buds in the previous autumn, being to provide against the loss of a shoot in case of any accident. As soon therefore as the strongest has grown sufficiently to be out of danger of being accidentally rubbed off, the other is to be cut out. If any other shoots have pushed besides the two principal ones, rub them all off.

“ Nov. 1 England; (Aug. or Sept. India.) Cut the vine down to the two lowermost buds.

“ *3rd year.*—Nov. 1; (Aug. or Sept.) The stem of the vine will now be more than two inches in girth, and therefore two leading shoots are to be permanently retained in the next year. For this purpose cut the vine down now to the *three* lowermost buds, thus reserving, as before, one to spare in case of accident. The vine will then resemble fig. 5.

“ *4th year.*—May 1. If fruit be shewn, pinch it off as in the preceding year.

“ July 1. Cut out close to the stem the weakest of the three shoots and train the two remaining ones carefully, during the remainder of the season.

“ Sept. 1. Pinch off the tops of the shoots.

“ Nov. 1. As the girth of the stem will not be less than three inches, the vine may be permitted to mature fruit the

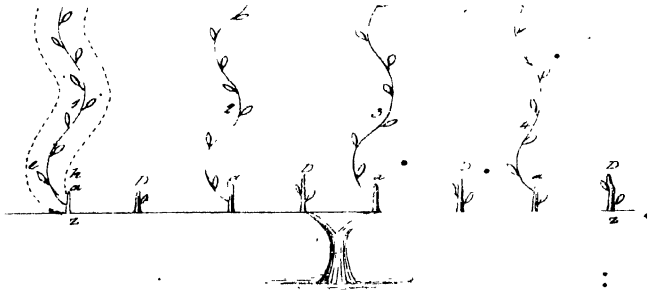


Fig 6

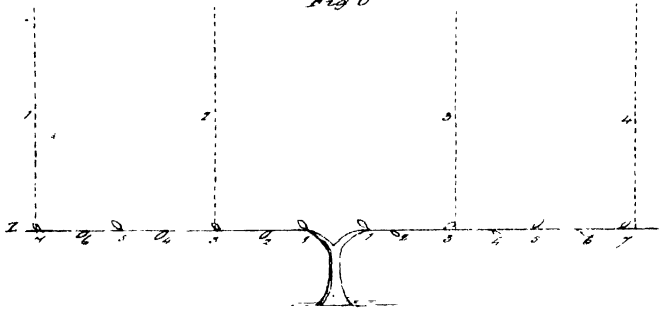


Fig 7

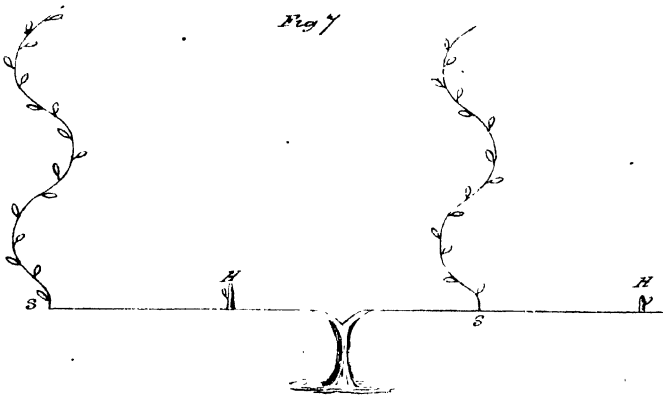


Fig 5



next year, not exceeding five pounds weight. For this purpose cut down the two shoots to the seven lowermost buds each; prune away the remaining portions of the tendrils and dead wood close to the shoots, and cut out, carefully, all the lateral shoots close to the bases of the buds, whence they have sprung. If the outer bark of the stem be decayed, peel it off clean.

5th year.—Feb. 1; (Nov. or Dec.) As soon after this time as the weather is open, cut out of each shoot, the first, second, fourth, fifth, and sixth buds; then bend the two shoots carefully down, and secure them in a horizontal position, similar to that represented by the shoots, z z, (see fig. 6.)

“May 1. Train the shoots that push from the shoots 3 and 7, in the manner represented by the dotted lines 1, 2, 3, 4, and if more fruit shews than is equivalent to the weight before mentioned, the excess must be cut off when the berries are set.

“Sept. 1; (July.) Pinch off the tops of the shoots, and the sap will then accumulate in the buds.

Oct. 1; (Aug.) As soon after this time as the fruit is gathered, cut back the first and third shoots, to as many buds as may be deemed necessary to produce the quantity of fruit which the vine can mature in the next year; and the *second* and *fourth* shoots to the lowermost bud each; cut out the lateral shoots and the stumps of the tendrils, as directed in the preceding years, and peel or scrape off all loose and decayed bark.

6th year.—March 1; (Dec. or Jan.) Train the two shoots in the manner represented by s s, (fig. 7) and those that push from the spars н н, train also in a similar manner; clean the surface of the ground and fork it up as in the preceding year.

“The vine has now assumed the form which it is permanently to retain, and the manner in which it is trained, may be considered as the commencement of a system of alternately fruiting two shoots, and training two at full

Fourthly. The above observations on the effect of warm, close, wet weather as the exciting cause of the germination of the seeds of fungi, derive additional strength from the fact that light has never been known to injure the crops in elevated and exposed situations; and that on the other hand, thick, rank crops which are laid down by rain or wind or by the weight of the plants, seldom escape the blight, from which I conclude that a free and unrestrained circulation of air among the corn is the best preservative from the evil; as preventing that confined moisture which is so favourable to the germination of the seeds of the fungi.

The constantly keeping of land under the same crop for a number of years is a practice universally condemned in Europe, and from Captain Sleeman's report, it appears to be equally condemnable in India; but I confess myself at a loss to perceive how it can contribute to the production of blight. Mr. Lambert in the piece which I copied from the Linnean transactions has thrown out the idea that this may be a cause of the disease, but has not supported the opinion by any facts or reasonings. It is possible however that the almost infinite multiplication of the seeds of these fungi by their perpetual reproduction in the same situation, might be effectually checked by judicious intervals of fallow, or rather of letting the land lie in grass on which stock should be turned to feed. This would prevent the multiplication of the destructive seeds by depriving them of a suitable place for germination. Such fallows should be continued for, at least, two years.

These are all the ideas upon the subject which I have been able to collect, and happy shall I be if they may be the means of suggesting any remedy for the evil, which has not occurred to me.

I am, &c.

W. CAREY.

TO THE HON'BLE SIR EDWARD RYAN,
&c. &c.

MY DEAR SIR,

I have read the extract from Capt. Sleeman's reports with attention. The calamity he describes is truly alarming, and I fear the application of a remedy will be found difficult. All I can say must be mere conjecture, as that gentleman in his report of 11th Aug. 1829, attributes the evil to an *Aphis*, and in that of Jan. 6th 1830, supposes it to be occasioned by a fungus. It is certain that both the insect and the fungus may ruin the finest crops of corn, or any other produce, and I have therefore looked into the opinions of those gentlemen, who in England have turned their attention to this subject.

In the fourth vol. of the Transactions of the Linnean Society is a piece by Aylmer Bourke Lambert, Esq. which describes what I suspect to be the cause of the evil complained of in the report of Capt. Sleeman, and as it is very short I shall take the liberty of transcribing it.—“The wheat in the west of England, especially in the counties of Wilts and Somerset, has of late years been very much injured by, what is there called, the blight, and generally supposed to be owing to an insect. In the year 1797 the wheat was very much hurt by it, and a few years before there were several fields near Warminster, so much injured that the farmers were obliged to cut it down long before it was ripe; for, as soon as a field is blasted, as they call it, which sometimes happens in a day and a night, vegetation stops, and the only way to preserve the crop from being entirely lost is to reap it immediately. I remember seeing a remarkably fine field of wheat, after one warm day's rain look at a small distance as if covered with soot, which I was informed was owing to insects, but on examination I found it to be a fungus, which no doubt, had been sown in the stem of the wheat, but wanted that kind of weather to occasion its vegetation. The stem of the wheat, where this fungus appears, is split,

(he should have said the cuticle of the stem—W. C.) and when a whole stem is almost covered with it, which is generally the case, it hinders the plant's growth.

“ I find the genus to which this fungus belongs well described by Perseer under the name of *Uredo*—thus *Pulvere farinaceo, thecâ orbatâ, sub-foliorum cauliumque epidermide effuso, hac demum margine lævi ruptâ*. He describes several species, but not that which I suppose to be a new one, and which I shall call *Uredo frumenti, lineari-oblonga fusco-nigricans*. It is always found on the stem of the wheat. The *Uredo segetum* of Perseer, var. a. *Hordei*. β *Tritici*. γ *Avenæ*, affects only the parts of fructification. It is in wet seasons that the wheat is most injured by this fungus, particularly what grows in low ground, as the crops on the hilly country are seldom hurt. I am informed that it is only within the last twelve or fourteen years that it has been noticed in the west of England, or at least that the wheat has been known to be injured by it. *May it not proceed from the land being too much worked, and not having that rest given it that it requires?* Whether this cause might have first brought the disease, or whether it might arise from a want of a change of crops, I leave to those to determine who are more in the way of making observations on Agriculture than myself.”

I have underlined a sentence which corresponds so exactly with what is mentioned in Capt. Sleeman's Report, viz. that the land is kept under successive crops of wheat, even to entire exhaustion, as deserving attention.

In the fifth volume of the same work is an account of some insects, and other fungi which are destructive to wheat. All these attack the grain, or rather the unripe ear. And in the sixth volume, is an account, by Mr. Curtis, of Aphides, in which their destructive powers are described. I suspect the fungus to be the cause of the evil complained of by Capt. Sleeman. It is a pity he did not examine the straw and ears, and inform us in which of them the disease is situated. Occasioned by Aphides the best remedy that I can think

of is burning the stubble, or in want thereof, burning grass thinly strewed all over the ground, this will destroy the eggs or young wherever they exist. If the evil be occasioned by a fungus, I know of no way of destroying the seeds of it, millions of which constantly float in the air, or of preventing its evil effects, except that of securing a vigorous growth to the plant by good husbandry, and avoiding, of course, the cropping to exhaustion.

Sir Joseph Banks's observations and a drawing of the destructive fungus were, I believe, published subsequently to the above. I have them somewhere, but cannot lay my hands on them now. I hope, however, these few remarks may furnish a clue to some remedy for the evil reported.

I am, &c.

17th March, 1830.

(Signed) W. CAREY.

TO THE HON'BLE SIR EDWARD RYAN,
&c. &c.

MY DEAR SIR EDWARD,

I return the specimens of damaged corn. I have examined the stalks of the wheat under a high magnifier, and have no doubt of the black marks on them being fungi of the genus *Uredo*. I suspect the species to be different from that described by Mr. Lambert, but am unable to say so with certainty. Perhaps the best remedy for it would be a more frequent change of crop, and the giving the land the benefit of a fallow or leaving it in grass, one year in three or four. This would be supposed by the native landholders, though without the slightest reason, to be a sufficient cause for an application to Government to remit a portion of its demands. If, however, my plan of letting land in properly bounded forms were adopted, there could be no plea for such application, as the land if not occupied one way, would be in another; and the tenant having to pay for his land, howsoever occupied, or, even, if left fallow, would be put

on his own resources, and probably would support more stock, or feed it better on his uncultivated lands.

I am, &c.

(Signed) W. CAREY.

26th March, 1830.

: TO THE HON'BLE SIR EDWARD RYAN, Knt.,

&c. &c.

MY DEAR SIR,

I return you, with many thanks, Dr. Carey's Notes on the causes of the blight from which our Provinces on the Nerbudda have so severely suffered. I have taken copies, which I hope I may be allowed to send to Capt. Sleeman, with a request that he may give his further and particular attention to the subject. There seems to be sufficient reason to believe that the evil is occasioned by a fungus, as stated by Capt. Sleeman in his last report and by Dr. Carey. The hints of the latter will be very useful to the former both in guiding his inquiries into the cause, and in directing to the discovery of a remedy for the evil, if there be any within our reach. And I shall be greatly obliged to Dr. Carey for the communication of any further suggestions that may occur to him calculated to promote those objects. He could probably indicate to Capt. Sleeman the course of observation and experiment that would best serve and discover how far the existence of the fungus is to be attributed to the effect of continued cropping upon the land, to the condition of the seed, to the state of the atmosphere or to the other accidents of season; and whether it is to be traced to the Ulsee or other plant as the first seat of the mischief. In a late number of the *Technological Repository* which I got from Stirling, the same phenomenon is described as having exhibited itself in some wheatfields near London in July last. The season was I believe a wet one: and an excess of moisture would seem to be generally mentioned as one of the circumstances preceding or accompanying the appearance

of the fungus. Could we assume it as a necessary cause, it would be satisfactory ; for it would at least fix a limit to the evil, and, with the state of the people of those districts, one cannot be very sanguine as to the early adoption of any remedy that depends on the care and forethought of the cultivators.

Yours very sincerely,

(Signed) HOLT MACKENZIE.

Calcutta, 30th March, 1830.

Extract of a letter from Major Sleeman, to the Secretary, Agricultural Society, dated Jubulpore, June 27th, 1838.

[Read July 11th.]

“I have made the enclosed extract from the narrative of my journey from the Nerbudda to the Himmaleh for such use as you may be pleased to make of it, as the circumstance seems to one of some Agricultural importance in India. I will ascertain from Mr. McLeod who has been in charge of the Jubulpore district, whether any of the poor people recovered the use of their limbs : I am afraid not.”

2nd December, 1835. Village of Kojunpore, 12 miles N. E. from the Saugor Cantonments.

In 1829 the wheat and others spring crops in this and the surrounding villages were destroyed by a severe hailstorm ; in 1830 they were deficient from the want of seasonable rain ; and in 1831, they were destroyed by blight. During these three years the Teora, or what in other parts of India is called Kisaree, (the *Lathyrus sativus* of Botanists,) a kind of wild vetch, which, though not sown by itself, is left carelessly to thrive among the wheat and gram, and given in the green and the dry state to cattle, remained uninjured, and thrived with great luxuriance. In 1831 the people reaped a rich crop of it from the blighted wheat fields, and subsisted upon its grain during that and the following year, giving the

stalks and leaves only to their cattle. In the year 1833, the sad effects of this food began to manifest themselves. The younger part of the population of this and the surrounding villages from the age of thirty down began to be deprived of the use of their limbs below the waist by paralytic strokes, in all cases sudden, but in some more severe than in others. About half of the youth of this village of both sexes became affected during the years 1833 and 1834, and many of them have lost the use of their under parts entirely, and are unable to move. The youth of the surrounding villages in which the Teora, from the same causes, formed the chief article of food during the years 1831 and 1832, have suffered in an equal degree. Since the year 1834 no new case has occurred, but no person once attacked had been found to recover the use of the limbs affected; and my tent was surrounded by great numbers of the youth in different stages of the disease imploring my advice and assistance under this dreadful visitation. Some of them were very fine looking young men, of good caste and respectable families; and all stated that their pains and disabilities were confined entirely to the parts below the waist. They described the attack as coming on suddenly, often while the person was asleep, and without any warning symptoms whatever; and stated that a greater portion of the young men were attacked than of the young women. It is the prevailing opinion of natives throughout the country that both horses and bullocks which have been much fed upon Teora are liable to lose the use of their limbs; but if the poisonous quality abounds more in the grain than the stalk or the leaves, man, who eats nothing but the grain, must be more liable to suffer from the use of this food than beasts which eat it merely as they eat grass or hay.

I sent the son of the head man of the village and another who were among the young people least affected into Saugor with a letter to my friend Doctor Foley, with a request, that he would try what he could do for them; and if he had any fair prospect of being able to restore these poor people to the use of their limbs, that measures might be adopted through

the civil authorities to provide them with accommodation and the means of subsistence either by private subscription or by application to Government. The civil authorities could find neither accommodations nor funds to maintain these people while under Doctor Foley's care, and several seasons of calamity had deprived them of the means of maintaining themselves at a distance from their families. Nor is a medical man in India provided with many of the means found most effectual in removing such affections, such as baths, galvanic batteries, &c. &c. It is lamentable to think how very little we have as yet done for India in the healing art—the art that above all others a benevolent and enlightend Government should encourage among the people of India.

W. H. SLEEMAN.

12th December, 1835. Extract from Major Sleeman's Diary.

[Submitted at a General Meeting of the Society, 11th July, 1838.]

The blight of which we were speaking had for several seasons from the year 1829, destroyed the greater part of the wheat crops over extensive districts along the line of the Nurbudda, and through Malwa generally, and old people stated that they had recollected two returns of this calamity at intervals of from twenty to twenty-four years. The pores with which the stalks of the wheat are abundantly supplied to admit of their readily taking up the aqueous particles that float in the air, seem to be more open in an easterly wind than in any other, and when this wind prevails at the same time that the air is filled with the farina of the small parasitic fungus, whose depredations upon the corn constitute what is called rust mildew, or blight, the particles penetrate into these pores, speedily sprout and spread their small roots into the cellular texture, where they intercept and feed upon the sap in its ascent, and the grain in the ear, deprived of its nourishment, becomes shrivelled, and the whole crop often not worth the reaping. It is at first of a light beautiful orange colour, and found chiefly upon the ulsee (linseed) which it does not

seem much to injure, but about the end of February the fungi ripen and shed their seeds rapidly; and they are taken up by the wind, and carried over the corn-fields. I have sometimes seen the air tinted of an orange colour for days by the quantity of these seeds which it has contained; and that without the wheat crop suffering any thing when any but an easterly wind has prevailed; but when the air is so charged with the farina, let but an easterly wind blow for twelve hours, and all the wheat crops under its influence are inevitably destroyed—nothing can save them. The stalks and leaves become first of an orange colour, from the light colour of the farina which adheres to them; but this soon changes to deep brown. All that part of the stalk that is exposed seems as if it had been pricked with needles, and had exuded blood from every puncture; and the grain in the ear withers in proportion to the number of fungi that intercept and feed upon its sap. But the parts of the stalk that are covered by the leaves remain entirely uninjured; and when the leaves are drawn off from them they form a beautiful contrast to the others which have been exposed to the depredations of these parasitic plants.

Every pore, it is said, may contain from twenty to forty of these plants; and each plant may shed a hundred seeds, so that a single shrub infected with the disease may disseminate it over the face of a whole district; for in the warm month of March, when the wheat is attaining maturity, these plants ripen, and shed their seeds in a week, and, consequently, increase with enormous rapidity, when they find plants with their pores open and ready to receive and to nourish them. I went over a rich sheet of wheat cultivation in the district of Jubulpore in January 1830, which appeared to me devoted to inevitable destruction. It was intersected by fields of ulsee, which the cultivators often sow along the borders of their wheat-fields exposed to the roads, to prevent trespass. All this ulsee had become of a beautiful light orange colour from these fungi, and the cultivators who had had every field destroyed the year before by the same plant,

surrounded my tents in despair, imploring me to tell them of some remedy. I knew of none ; but as the ulsee is not a very valuable plant, I recommended them as their only chance to pull it all up by the roots, and fling it into large tanks that were every where to be found. They did so, and no ulsee was intentionally left in the district ; for like drowning men catching at a straw they caught every where at the little gleam of hope that my suggestion seemed to offer. Not a field of wheat was that season affected I believe in the district of Jubulpore ; but I was soon satisfied, that my suggestion had had nothing whatever to do with their escape ; for not a single stalk of the wheat was I believe affected, and some stalks of the affected ulsee must have been left by accident. Besides in some of the adjoining districts where the ulsee remained in the ground, the wheat escaped. I found that about the time when the blight usually attacks the wheat, westerly winds prevailed, and that it never blew from the east for many hours together. The common belief among the natives was that the prevalence of an east wind was necessary to give full effect to the attack of this disease upon the wheat, though none of them pretended to know any thing of its *modus operandi*—indeed they considered the blight to be a *demon* which was to be driven off only by prayers and sacrifices.

It is worthy of remark, that hardly any thing but the wheat suffered from the attacks of these fungi—the ulsee upon which it always first made its appearance, as far as my observations extended, suffered not much though the stems and leaves were covered with them. The gram (*Cicer arictinum*), suffered still less, indeed the grain in this plant often remained entirely uninjured while their stems and leaves were covered, in the midst of fields of wheat that had been entirely destroyed by the ravages of the same kind of fungi. None of the other pulses were injured though situated in the same manner in the midst of the fields of wheat that were destroyed. I have seen rich sheets of uninter-

rupted wheat cultivation for twenty miles by ten in the valley of the Nurbudda so entirely destroyed by this disease that the people would not go to the cost of gathering one field in four; and during the same season its ravages were equally felt in the districts along the table lands of the Vindeya range, north of the valley, and I believe those upon the Sathpore range south. The last time I saw this blight was in March, 1832, in the Saugor district, where its ravages were very great but partial; and I kept bundles of the blighted wheat hanging up in my house for the inspection of the curious till the beginning of 1835.

Note.—I am disposed to think that at a certain stage the stalks of the wheat are secured from the depredations of the parasitic fungus by the hardening of the silicious substance of which its epidermis is composed. I found whole fields of gram (a vetch) almost entirely uninjured though adjoining to fields of wheat that were entirely destroyed. The wheat which had been sown early and upon high grounds, and had become almost ripe when the blight began to spread itself, was hardly at all injured in any part of the district; while that which had been sown late or upon low damp grounds, and was consequently much less advanced, was every where almost entirely destroyed. It seems to me and to the farmers and cultivators throughout the district, that in the same field the stalks which had become nearly ripe when the blight began, were hardly at all injured, while those in a less advanced state were almost covered with the fungi; and the grain in their ears left entirely without substance.

The epidermis of the wheatstalks is known to have a greater portion of silicious earth than that of any other plant save the sugar-cane, from which it would appear that nature considered the sap of this plant more liable to the depredations of the Aphides and other insects, and of these parasitic fungi, than that of any other save the sugar-cane, and, consequently more in need of this peculiar defence. Certain it is that of all the numerous family of grains and pulses which

compose what we call our spring crops and ripen at the same time as the wheat, not one was much injured, while all the wheat in the neighbourhood, and even in the same field was almost entirely destroyed, though they were all in about the same state of maturity, and none of them had in their epidermis one quarter of the portion of silicious matter that the wheat had; it follows therefore that they must have had less pores to admit the farina of these parasitic fungi, or that their sap must have been less congenial with their growth, and less inviting. It is likely that their sap is less liable to the depredations of the Aphides, and the fungi abound as they advance to a state of maturity; it is, therefore, defended by a softer epidermis which can take up the particles of moisture that float in the air without the aid of pores either so large or so numerous as those with which the harder epidermis of the wheat requires to be supplied. If this be the case the wheat would be more liable to injury from the enemy, should they attack it either before the epidermis hardens, or after it has been hardened while these pores are more open than usual, as I think they are with a sultry easterly wind.

During the season when almost all the wheat in the district of Jubulpore was destroyed by blight, accidents of a peculiar kind had deprived the stalks of the protection which they required, and which they usually have at the time when they stand most in need of it. On the 20th November, 1828, when the greater part of the wheat lands in the district had been sown, very heavy rain began and lasted for several days. It flooded all those lands that were naturally low, or enclosed, as the greater part of the richest lands in the valley of the Nurbudda are, with artificial embankments, destroyed entirely all the seed which had been sown in them, and rendered it necessary to plow and sow them over again. At the same time it retarded till too late, the sowing of those lands which had not been sown when the rain began, either from being naturally low and moist, or so deeply flooded by embankments during the season of the rains as

to require a longer period to dry and be fitted to receive the seed. The crops which spring from the second sowing on low or flooded lands, were in every field of the district entirely destroyed by the blight. The same may be affirmed of all those fields which were flooded a second time by the rains of November, and could not be sown till they again got dry, whether they had been once sown before the rains came on or not.

The wheat which had been sown before the rain came on, and upon high and dry lands, suffered comparatively very little injury from the blight; and such as was sown for the first time upon high lands even after the rain of November, escaped, because the sowing was not retarded by the moisture of the soil but took place immediately after the rain ceased; and the crops always ripen much earlier upon high than upon low lands. The stalks had become hard before the air was filled with the farina of the parasitic fungi that preyed upon their neighbours of less advanced growth. So small was the proportion of the lands so favorably situated compared with that which, from natural position or artificial bunds, was flooded after every very heavy fall of rain, I believe the total amount of the wheat gathered in the harvest of 1827, in the district of Jubulpore, was not equal to the total quantity of seed that had been sown.

The suddenness of the attack of this disease upon the wheat and the appalling rapidity with which it spread itself over the fields, impressed the people of this district and of these territories generally with the belief above stated, that it was an evil spirit or demon permitted by the deity to visit the land as the instrument of his vengeance to punish mankind for their iniquities; and they supposed him first to make his appearance on the night of the Seorutree or the 3rd of March, and to complete his work of destruction on the night the Hooly is burned or the 20th of that month. The disease began first to manifest itself upon the leaves of the wheat about the 10th of March, 1829, and from that time I watched its progress till its work of destruction had

been completed about the end of the month. These leaves covered all the lower part of the stalk of the wheat and sheltered it from the depredations of the fungi; and while the surface of these leaves were covered with it and became brown all over, the stalk was penetrated only towards the top where it was left exposed. When the leaves were pulled off the contrast between the dark rough brown colour of the upper part, and the bright glossy straw colour of the lower was striking; it looked like a piece of metal polished at the lower and covered with a deep rust on the upper part.

The questions that suggest themselves are—1. Are these fungi always present during the month of March, and ready to attack the wheat under those circumstances that favor their depredations? 2. If they are always so present, can any means be devised to prevent their attack under any combination of circumstances? These were questions that I asked myself at the time. It was my duty to suppose the first question answered in the affirmative, and to adopt those measures that seemed to me best calculated to prevent their attack. I had all the ulsee in the district in which it began to make its appearance in December, 1829, pulled up and thrown into tanks to rot, and I urged on the sowing of the wheat so that it should be every where in the ground before the beginning of November. During that season not a single wheatfield in the district was injured. I made over the civil charge of it in November, 1830, and during that season little injury was sustained; but in the third season 1831-32, the crops suffered almost as much as in 1828-29. That was the last season—little or no injury has since been sustained from blight, nor has it, I believe, since made its appearance in the ulsee or any other crop. I am therefore disposed to think that my measures had little or nothing to do with the preservation of the crops in 1829-30, that the immediate cause of this species of blight the farina of the parasitic fungi is not always present in the month of March when the wheat is most exposed to danger; and that when it is present a combination of circumstances favorable

to its attack is necessary to render it very destructive ; and that among these circumstances the prevalence of an easterly wind and close sultry weather are by far the most formidable. I think, however, that whenever the cause makes its appearance in a country it will be likely to remain for several successive seasons ; and that it may be of great use at such times to urge on the sowing of the wheat so that the seed may be all in the ground early ; and if the ulsee or any other crop in which it appears early in the season were pulled up and thrown into tanks, the cause would be thereby removed, and the wheat saved under any combination of circumstances favorable to its attack. The wheat might, no doubt, be saved without this precaution, because that combination of circumstances may not take place, but it might all be destroyed without such a precaution if the combination should take place.

Old and respectable landholders in the district of Jubulpore state, that in Sumbut 1843, A. D. 1786, the wheat crops throughout the district were destroyed by the same calamity ; and that the Saugor government was obliged, not only to remit the land revenue, but to provide a supply of seed grain for almost every village by advances from the public treasury. This supply of seed grain was given out to the cultivators at an interest in kind of twenty-five per cent. The grain received as interest was sold every year on account of government, while the principal remained as a sacred deposit during all the rest of that government, and the whole period of the Nagpore administration, and was sold to the landholders after we took possession in the year 1829. In 1862 Sumbut the wheat crops of the district again suffered greatly from blight under the Nagpore Government, but not nearly to the same extent, and it made its appearance first under our Government in the year 1837, or Sumbut 1884. It is worthy of particular remark that the old landholders and cultivators of the district declare that when the blight took place in 1843 Sumbut, the greater part of the wheat lands had been sown a second time in consequence of the first seed

having been destroyed in the ground by unusually late and heavy falls of rain as in the present case. It should be further remarked, that I for the first season was satisfied, that the source of the disease was animal, not vegetable, that the depredators were the Aphides and not the fungi; there was nothing in the appearance to the naked eye to undeceive me, nor any thing in the effects produced, or in the *modus operandi*. In one case the sap is drawn out by an insect with its *proboscis*, and in the other by a fungus with its *roots*; and if we supposed the Aphides so employed in drawing out the sap, to form a crust around itself in the same manner as the lack insect, the external appearance would be almost exactly the same. The following season satisfied me that I was wrong, but I had not been in error from a want of care in my observations, but from a want of a good microscope. The late Mr. Professor Carey, one of our best botanists, examined some of the stalks of blighted wheat sent down from Saugor in March, 1830, under a very high magnifex; and was quite satisfied, that the spots upon them, which had then become very dark brown, were fungi of the genus *Uredo*. The best means for saving the crops from the depredation of these fungi should they ever return, as they no doubt will, would be to persuade the people to sow nothing but gram and other pulses little liable to suffer except upon the highest and dryest lands.

There is a good article on this species of blight in the 7th volume of the Edinburgh Review. It is a review of a small work on the subject by Sir Joseph Banks, which I have never had an opportunity of seeing.

Remissions of the Government demand of the land Revenue in the Saugor and Jubulpore Districts on account of blight.

	Jubulpore.		Saugor.		Total.	
	Land Revenue Assessment.	Remission on account of blight.	Land Revenue Assessment.	Remission on account of blight.	Land Revenue Assessment.	Remission on account of blight.
1827	6,20,160	₹3,847	6,19,931	„	12,40,091	43,847
1828	6,25,769	14,352	5,17,940	„	11,43,709	14,352
1829	6,18,345	2,11,763	5,16,883	88,698	11,35,228	3,00,461
1830	6,06,802	„	4,61,218	25,600	10,68,020	25,600
1831	5,55,215	„	4,66,809	1,69,004	10,22,024	1,69,004
1832	5,55,215	1,99,084	4,64,617	86,910	10,19,832	2,85,944

Extract of a letter from Major SLEEMAN to the Secretary, dated, Jubulpore, 10th August, 1833.

[Read 12th September.]

“ I send at the same time the translation of a Report I have received from Mr. D. F. McLeod regarding the poor people who lost the use of their lower parts from eating the Teora, as described by me in a former paper. He sent out a person from Saugor to ascertain whether any of these people had recovered, and this is the report he has sent in. From this it would appear that the effects of the poison upon the system are permanent, and that the poor people have no hope of ever recovering the use of their limbs.

“ I sent to Sir E. Ryan a long paper upon the blight which afflicted these territories from 1829 to 1833*. To the general reader, it might be more interesting than if confined to a mere description of the disease and its effects upon the crops, but you may not think it worth while to print papers for the general reader.”

* See the preceding paper, which has been pruned of all the superstitious notions of the people on the subject of the cause of the blight.—ED.

Report upon the persons who lost the use of their limbs from feeding upon Teora in the village of Kunchunpore and its neighbourhood in the purgannah of Dhamonee made to Mr. McLeod in charge of the Saugor district in August, 1858.

Purgannah & Village.	Name.	Caste.	Age.	Sex.	Remarks.
Khojunpore purgannah Benaika,	Dheera	Danges	25	Male	In the Sumbut 1858 he got a paralysis of the lower limbs from eating of the grain "Teora," receiving a letter from Mr. Sleeman to the doctor, went to Saugor and was under medical treatment for 2 months but received no relief, and has remained in the same state to this period.
Ditto,	Omrao	ditto	30	ditto	In the abovementioned Sumbut he got a paralysis of the lower limbs. On making inquiries I found that Teora was more abundant this Sumbut than other grain, and that the people had lived from February to October, upon it. In the cold weather they got great pain in the limbs which increased; they tried many remedies but received no benefit: many who had eaten the grain escaped.
Ditto,	Juggut son of Omrao	ditto	10	ditto	ditto.
Ditto,	Gorah son of Omrao	ditto	8	ditto	ditto.
Ditto,	Puthareeah daughter of Omrao	ditto	12	Female	ditto.
Ditto,	Mungun	ditto	22	Male	ditto.
Ditto,	Kurhoree	ditto	20	ditto	ditto.
Ditto,	Name unknown	ditto	25	Female	ditto.
Ditto,	Mundra- ni's son's wife				ditto.
Ditto,	Tejjee	Carpenter	30	Male	ditto.
Khoharee purgannah Patan,	Mundan	Lodhee	40	ditto	In the Sumbut of 1858, he got a paralysis of the lower limbs from eating of the grain called Teora and receiving a letter from Mr. Sleeman to the doctor, went to Saugor and was under medical treatment for two months but received no relief, and has remained in the same state up to this period.

Purgannah & Village.	Namē.	Caste.	Age.	Sex.	Remarks.
Koharāe purgannah Patan,	Kuranjoe	Lodhee	22	Male	Was attacked with paralysis and has not recovered.
Ditto, ..	Runjore	Buneca	25	ditto	ditto.
Rehjee purgannah Benaka,	Gunesh	Dhoble	50	ditto	ditto.
Ditto, ..	Mulkhan Sing	Lodhee	30	ditto	ditto.
Rhampoorā, Mullickpore,	Ramdeen	Brehmin	40	ditto	ditto.
Ditto, ..	Mandhata	Buneca	40	ditto	ditto.
Samrah purgannah Benaka,	Chundra	Koormee	30	ditto	ditto.
Ditto, ..	Luchmin Sing	Lodhee	25	ditto	ditto.
	Ranjoo	Dhemah	25	ditto	ditto.

True Translation,
W. H. SLEEMAN.

XXIII.—Otaheite Sugar-cane.

Major SLEEMAN's opinion of the Otaheite cane, contrasted with the purple and straw-coloured cane of India.

Extract of a letter from Major SLEEMAN to the Secretary of the Agricultural Society of India, dated Jubulpore, August 10th, 1838.

[Read 12th September, 1838.]

"I think it right to send you the copy of a letter I have addressed to the editor of the Agra Uckbar, in reply to some observations made by him in his papers of the 26th and 28th of last month regarding the culture of the Otaheite cane. I do not think that any practical planter after seeing one of my fields of cane would advocate the cultivation of any other that he has seen in India."

Having mentioned in your paper of the 26th ult., an experiment made for the purpose of ascertaining the relative produce of the Otaheite and common cane of the country, I will perhaps do me the favor to give insertion to one

made by the Potel of a village in the district of Baitool, some two hundred miles from Jubulpore, and communicated to me by Major Ouseley. Sugar-cane is cultivated as well in that district as in any part of India.

The canes which were superseded by the Otaheite cane in the West Indies and the Mauritius were, I believe, very like the common large purple cane of this country, puchrunga; and this purple cane will, I think, disappear before the same cane in this country, as it did in those Islands. It will disappear more slowly no doubt; but it will, I think, disappear, because there is no native who does not perceive the great superiority in the quality of the one over that of the other, though he is at first afraid that the difference of the expense in the cultivation may more than counterbalance the greater rate of price in the market.

The bazars of the town of Jubulpore and those of many other towns in these territories from the beginning of November to the end of February, are filled with the Otaheite cane grown by the natives themselves, and sold as a fruit. As a fruit it is greatly preferred by the people to the large purple cane, because the juice is much finer. It is not I think considered finer than that of the common straw-coloured cane of the country; but one Otaheite cane will weigh as much as six of the best straw-coloured canes; and if the juice be equally good, as I believe it to be, the cane will be better, because the weight of juice in proportion to the weight of the cane will be greater. In the six canes there will be more of the refuse or rind than in the one. Your correspondent does not mention the quantity of the cane; and we cannot judge fairly of the result of the experiment till we know, 1st, the relative quantity or weight of juice compared with the weight of cane; and the weight of sugar compared with the weight of juice.

The introduction of the Otaheite cane into the West Indies by Admiral La Forey, is said to have created a little revolution in the value of landed property, so much more saccharine matter did the juice of this cane yield under the

same system of culture. Humboldt says, the same extent of ground under cultivation with the Otaheite cane yielded a third more juice, and the juice was better.

Though several kinds of cane were cultivated in the Isle of France, when this cane was introduced from Java, there was not in seven years after another kind of cane to be found I think. That the natives say it costs much to cultivate it in the way we wish to have it cultivated, is true ; but do they not say the same of cotton and every thing else that we want to see better cultivated ? If a native were to be told that to secure good cultivation in England a farmer requires to have stock invested in his farm equal in value to ten times the annual rent, while in India his stock is seldom equal in value to one quarter of his annual rent ; and propose to him to go upon the same system, he would tell you that it was far too expensive a one for him.

The best planter in the Isle of France once told me, while I was looking over his fine fields of cane that common observers seemed to think nothing could make finer, that if he could afford to double his stock he would not cultivate one acre more land, because he knew that the application of the new stock to improve the quantity or quality of the cane upon the old lands already in tillage would yield him better returns. The straw-coloured cane of India, of which there are three kinds (the best is here called *kooseear*) is a very good cane, and might be improved by an improved system of tillage ; but the natives generally would consider that system, if it were pointed out to them, a great deal too expensive, " it would take up too much land ; or require too much manure, or labour, where tenure is so precarious, interest of money so great, and while the subsistence of his family for the year depends entirely upon the returns of the single season !"

In the Isle of France one hundred pounds of cane gave from forty to fifty pounds of juice, and from fifty to sixty of refuse, or *bagasse*, according to the quality of the cane, the degree of its maturity, and the kind and quality of the mill in which it was pressed. The same weight of cane often

gives different quantities of juice according to the soil from which it is produced : and the same cane from the same soil will give different quantities, as it is cut more or less seasonably. It has been estimated that good horizontal rollers will give ten per cent. more of juice from the same cane than vertical ones. If such is the difference between mills of the best European manufacture what must it be in the rude *pestle and mortar* kind of machines used by the natives. Fifty pounds of juice generally gives from five to six pounds of fine sugar, and the coarse sugar made from the scum amounts generally to about fifteen per cent. upon the fine sugar.

Nothing could be more useful than such experiments as your friend appears to have been engaged in making, but they should be fully made and fully and clearly stated under the authority of name, place, &c. &c. before the cultivation of any one article is so sweepingly condemned. I have never yet had an opportunity of seeing the Otaheite cane tolerably cultivated any where in India except in these territories. Sugar is not made in any one of our Nurbudda districts, but goor of very excellent quality is made in all of them, and exported in great quantities. In 1833 and 1834 I caused a good deal of excellent sugar to be made at Jubulpore by men that I invited down from the sugar districts north of the Ganges, and the result of the experiments then made showed, that the large purple cane of the country yielded produce so very inferior in quality and quantity as to be considered as comparatively worthless for manufacture. The fine small straw-coloured cane of the country yielded sugar of as good quality as the Otaheite cane ; but the juice was less in proportion to the weight of the cane. I was stationed at Saugor and could not *assist* at the experiments, and they were in consequence discontinued. I came to Jubulpore in 1835, but before the sugar season came on was obliged to go to the hills, so that I have not myself seen any of the experiments. Knowing that the cane had been spread a good deal over the districts under Major Ouseley, I wrote to him in April last, and re-

quested that he would let me know the result of any experiments that might have been made by him or by the natives of his districts.

Your observations upon the character of different soils as adapted to the growth of canes generally may be very good ; but there is not any reason to believe that Otaheite cane requires a soil different from any other cane. A soil containing much of the detritus of rocks of volcanic origin is no doubt good for all canes, but is by no means more essential to one than to another kind ; nor is it necessary to suppose, that this soil contains more *heat* than any other soil. All canes require a soil well stored with silicious matter, as does wheat and all other plants whose epidermis contains so much silex ; and hence chiefly the advantage of a basaltic soil.

The three grand points are good manure, good irrigation, and good *manipulation* ; and with these three there is hardly any district in India where good cane may not be produced for the mill.

Major Ouseley's reply.

“ You will see by Kasee Ram's abstract report, that the two last have been good cane years. The people like the Otaheitian cane so much more than the common cane for *eating*, that they have as yet hardly used it for sugar. The goor from it is particularly fine, the sugar cleaner and better than any other. By sugar I mean the refined goor.

“ Inderjeet Chowdree of Amgow has some very fine in his garden, some at Raipore ; they all say it takes more trouble to cultivate it, but the juice is better and the goor far superior. I could send you some of both years if you wish it. It is now found in every village where the soil is good. I forget how many years it is since you sent it to me first.

Believe me, &c.

(Signed) J. R. OUSELEY.”

Shungabad, 7th May, 1838.

“ In the village of Zumanee in the Baitool district where I sent the cane from my own garden, the following table exhibits the results of the experiments made by Kassee Ram.

“ For 1244 and 1245, Fusley, the accounts are made out, but no price set on the white, or Otaheite seed cane (the black is charged); nothing has ever been charged for the Otaheite cane by me; it is now spread about in all directions in Narsingpore, Baitool and Hoshungabad. I requested the Zumanee Potel to make an experiment in goor, and grow the cane in measured beegahs or acres which he has done. He says the Otaheite, or your cane, is far superior to the old thick black, or their thin Burahee: the Otaheite cane in one beegah gives 110 rupees produce if a good year; the black at best is not beyond 100 rupees, expenses nearly equal.”

Statement of produce of Sugar-cane.

	One acre Otaheitian.			One acre country thick black.		
	Expenses.	1244 Fusley.	Rupees.	Expenses.	1244 Fusley.	Rupees.
Government Rent,	3 0			3 0		
Sowing labour, ..	1 4			1 4		
Fences,.....	0 12			0 12		
Weeding,.....	1 12			1 12		
Watchman,	6 0			6 0		
Water bug. (mote,)	4 0			4 0		
Ropes, &c.	1 0			1 0		
Workmen or Gardeners 2 at 3 Rs. each for 6 months,.....	32 0			32 0		
Price of seed,				10 0		
Bullocks,.....				..		
		Produce 5 gones (or 15 mds. of goor) at 20 Rs. a gone.	Value, 100		Produce 4½ gones of goor at 16 9 a gone.	Value, 75
					Produce 4½ gones (or 14½ mds. of goor) at 17 Rs. a gone.	Value, 80 12
			Produce 5½ gones (or 16½ mds. of goor) at 20 Rs. a gone.			
			Value, 110			
Total,	49 12		100	68 12		80 12
Deduct,			49 12			68 12
			50 4			12 0
			60 4			6 4

(Signed)

J. R. OUSELEY.

XXIV.—*Sugar Manufacture at Singapore.*

The culture of the Cane and manufacture of Sugar introduced at Singapore. By J. BALESTIER, Esq. American Consul in that Island—communicated to the Agricultural Society of India, in the following letter from that gentleman to the Secretary, dated 11th July, 1838.

[Read 12th September, 1838.]

On the 20th March last I had the honor to address to you a note, and two bundles of Sugar-canes, by Mr. McLean, a Member of your Society, then on his return to his Indigo factory in Calcutta.

As I have not seen any mention of this receipt in the monthly transactions of the Calcutta Agricultural Society, up to the meeting in June, I am led to conclude, that by some mischance, they have not reached their intended destination. And in furtherance of the efforts making by the Society to introduce in India plantations of the best kinds of canes, I beg again to send, for the Society's use, two other parcels of the same species as those formerly put under the care of Mr. McLean.

Bundle marked No. 1, contains a yellow cane, known under the Malay name of "Taboo Tilor or Egg-cane," probably because it assumes an oval shape between the joints. It is a fine clean cane, tender and sweet and is fit for grinding in twelve months from the time of planting.

Bundle marked No. 2, contains another description of yellow canes, which as before said, in the former note, I believe to be identical with the "Teiti" cane. I formerly said that I was warranted in so believing having seen a great quantity of canes in the West Indies and in Continental America, and nothing has occurred since to change that belief.

One of the parcels formerly sent contained a specimen of the cane, known here under the name of Salangore—having none just now in a fit state for cutting, I am unable to address any to you at this time. And I am bound to say that

a better knowledge of them leads me to apprehend they are less valuable, as a sugar plant, than the two specimens you have transmitted herewith; that is, provided rapid growth be a required condition. I have found invariably these Salangoor canes to keep far behind the yellow ones, and at this time, when these latter ones are passing through the mill perfectly ripe, the former, although mixed up with them in the same fields, are totally unfit to grind. But still, their reputation for sweetness, among the Malays, and their very great beauty, determines me to plant a field of them, on trial.

I formerly said that I had found so much trouble in my endeavours to clarify the purple cane, that I had given up planting any of them, more particularly as the other species, found here, possessed every requisite, such as quick growth and easy separation of the fecula and mucilage contained in them by the admixture of the least quantity of lime or lime-water.

I noticed sometime ago in the papers an intimation on the part of the Bengal Government to adjudge a premium, by way of encouragement, to any person who would first put under sugar-cane cultivation, fifty acres of land: and I further observe among the proceedings of the Bengal Agricultural Society, a desire to encourage the growth and manufacture of sugar by a premium to him who shall produce the best sample of Muscovado sugar, made after the West India process. Having at great expense of trouble and money put upwards of that quantity of land into plantations of sugar-canes, and erected a water-mill, boiling and draining and other necessary houses for manufacturing sugar: and having actually commenced and made sugar, I would wish to avail myself of any advantages to which my labors may be fairly entitled, and shall feel greatly obliged to you, Sir, to inform me whether those recompenses are held out to the inhabitants of the Indian peninsula only, or whether it be comprehensive, and embracing all inhabiting the territories of the East India Company. In that case, I should be glad to

enter the list of competition and put in my claims, and should be glad to be informed what musters are required.

You will be pleased to receive herewith also a small muster of Muscovado sugar, made from the Teiti cane on my plantation, by the following process, under my own superintendance.

The cane ground by a horizontal wooden mill, lined over with hoop iron, and the juice led in wooden gutters to the receiver, which is lined, inside, with sheets of cast tin and lead: two ounces of lime dissolved in the receiver and six ounces more added when the Grand containing two hundred gallons, receives a full charge of juice from the receiver: the juice is divested of its gross impurities by being made to pass through two thicknesses of gunnies before it enters the receiver. After skimming off the principal black scum thrown up by the action of heat and lime on the Grand, the liquor, in passing into the second, or clarifying boiler, or copper, is thrown on a filter, (lined likewise with sheets of cast tin and lead,) consisting of gunnies and fine cotton cloth, and as this filter is portable and is laid between the two coppers, it falls into the second copper quite clear of dirt.

After being well skimmed and boiled down to about 30 degrees of the arometer of Baumé, it is then lifted up in tubs and put into a large filter on the side of the house. This filter is a large box, lined as the smaller one with tin and lead sheets, and has two bottoms: on the lower bottom, which is full of little holes to allow the clear liquor to pass, there is laid a thick blanket and a gunny: 2nd, a layer of coarse, white, and well-washed river sand, two inches in thickness: 3rd, three thicknesses of gunnies; and 4thly, another perforated covering of thin plank upon which the liquor is thrown from the tubs. The liquor as required, is drawn off from the reservoir between the two bottoms and reaches thus the Teache, or concentrator, by means of a conduit, quite clear and free from foreign substances of any kind. It is then concentrated by means of a thermometer to 230° of Fahrenheit, and dipped out into large flat coolers, also lined inside with

tin and lead, and when somewhat cooled and granulated on the following morning, the coolers are emptied of their contents, which are put into clay moulds, or into wooden crystallizing boxes. In two or three days, the stops at the bottom of the forms are removed, and the molasses is suffered to drip into pots or to run through the small gutters into the cisterns. When well drained the sugar is clayed and whitened in the usual way. I ought perhaps to have said that my boiling apparatus consists of three wrought iron boilers set over one common furnace.

I beg to add, under this enclosure, the Singapore Free Press, of the 31st May, which contains a summary account of my labors under the signature of Agricola.

“In compliance with the desire expressed by you for some information as to the result of the attempt made by me to grow sugar-canes, and to manufacture the same into sugar, I have the pleasure to send you the following statement.

“Soon after the series of remarks which I addressed to you in the first numbers of the *Free Press*, and which I trust contributed to remove the erroneous opinion then entertained of the agricultural capabilities of this Island, I undertook, notwithstanding what was said and written about the soundness of those remarks, to bring into cultivation a piece of low clayey ground covered over with water during the whole year,—for it was overgrown with a dense jungle and quite impervious to the sun’s rays. To remove this stagnant body of water, it was necessary to cut outlets to a bend of the river Kalang on which the estate is situated at some distance below, which, owing to the numerous roots in the ground, proved to be a tedious and expensive operation. The labourers too, very reluctantly persevered in the work because of the annoyance of leeches, and but few could be had who would venture their limbs to be lacerated by them. At last when the water was got rid of, and the mud hardened sufficiently to allow a footing to the coolies, the under brush and the forest soon fell under the axe, and with the help of the Backwoodman’s faithful ally—fire—a clearing

was made. But fire could not reach the embedded roots, and the first attempts at grubbing were truly disheartening; for it often happened that when all above ground had been destroyed by fire, a few days of dry sunshine would cause the surface of the soil to settle, and bring within reach of the hoe, or of the spade, logs of immense size, many of which had probably for centuries been there buried; and as they were in that state where it was impossible to burn them, the only resort was to cut them up, and it not unfrequently gave rise to an obstinate contest between the well-tempered American axe, wielded by a nervous Chinese arm, and the stubborn antediluvian. But that which was then so disheartening is no longer so, for the labourers now make nothing of such obstacles—as a matter of course they cut them up, and when taken out, pile and burn them.

“When some twenty acres had been dressed, it was planted with Pernambuco cotton; and although at first the young plants gave favorable indications, disappointment soon followed, for they were attacked by a red worm and withered; and those which were not destroyed gave too few pods to make it worth the while to continue the cultivation. Meanwhile the process of clearing went on and plantations of sugar-canes took the place of cotton. The few attempts at the cultivation of the canes by the Chinese exhibited such fine specimens, as to leave but little doubt of its doing well under European management. These are principally of two species; viz. the purple or red, and the yellow, which latter is identically the same as the Otaheite—the juice of which was found afterwards of the density of $8\frac{1}{2}$ of the Saccharometer and easily clarified by the addition of the least quantity of lime-water: whilst it was hardly possible to effect a separation of the mucilage and fecula in the juice of the red canes by the agency of any quantity of lime and heat. The plantations were made of the yellow canes, and only a limited quantity was grown, and for eating only, it was not without very considerable difficulty that enough of plants could be obtained, and the most part of these, under differ-

ent circumstances, would have been rejected as they would only sell the worst. But as it was, they were gladly bought even at the extravagant price of one dollar per hundred. Poor as they were, they were made still more useless by a habit not unfrequently practised by the Chinese labourers, of selecting the best for eating, and contenting themselves to plant what remained of the piece. It was under these unfavorable circumstances that the first twenty acres were planted in the beginning of 1836. In the following year, a selection of the product of these canes served to extend the plantations forty acres more. About this time the old mode of planting, that is by inserting the plant in ridges of ground thrown up for the purpose, was abandoned for the improved manner of depositing two plants, about a foot long, side by side into holes eighteen inches in length, six in width and twelve in depth, and covered over with a thin layer of dried grass or leaves to shelter them from the sun. To this change, and to the careful selection of good plants, is owing the marked difference observable in the new from the old plantations, and the far greater abundance and better quality of sugar which these yield.

“ Having thus far proceeded it became necessary to procure the implements for manipulation; and as the settlement offers no resources whatever in machinery, or even mechanics acquainted with what is technically called plantation work, it was necessary to send to Calcutta for a set of iron boilers, and to set about making a water-wheel and a wooden crushing-mill, in the mean time. The wheel was made on the tub principle from an American patent, and the mill on the ordinary horizontal plan, both of which under the efficient superintendance of the manager on the property, were completed, notwithstanding the difficulties and obstacles to overcome. In order to obtain a supply of water for the mill, a canal twenty feet wide and nearly a mile long, was cut into a small stream which falls into the Kalang and which in ordinary times affords a sufficient power. This canal, and another one previously made in conjunction with the owner of an ad-

joining property to prevent the overflowing of the Kalang during heavy rains, occasioned great delay and expense. These were not the only cuts, for the flatness of the ground, throughout, made it necessary that it should be intersected at short distances by deep drains to carry off the rain.

“The term of twenty-year leases offered by the East India Company not admitting of their tenants laying out money in the erection of expensive and permanent buildings, a boiling and a curing house of wood, and some other cheap sheds were put up, to answer present purposes, and will probably last out this limited period, when, should the estate revert to the Company, or go into other hands the loss will be but trifling. The boiling house was arranged after the latest improvements in the West Indies, only that instead of a range of five, there are but three boilers of wrought iron. The plantations of canes not exceeding 60 acres, that number of coppers was deemed sufficient for the present, more particularly as the liquor is made to pass through a filter composed of a thick blanket, a stratum of six inches of coarse river sand and a cotton cloth of a thick texture, which retain all the fecula and mucilage, and sends the liquor into the Teache quite limpid. In the curing house clay moulds and crystallizers made of wood are used to drain and to clay in. It required sometime to get the Chinese potters in the way of making them of a suitable size and form, and clay of a good kind is to be had close at hand on the property.

“In January of the present year every thing being in a state of readiness to commence the crop the greatest difficulty of all—the want of experienced sugar-makers capable of directing the operations of this manufacture were of the utmost importance. But as on the Island, I was the only person who had the least knowledge of the business, and that not practically, having only been an occasional looker-on during repeated visits on sugar estates in the West Indies, it became necessary to put that little knowledge in practice, and moreover to form a whole set of raw hoppers and initiate them in the business of tempering, skim-

ming, boiling to proof, potting, draining, and finally claying. It was thought preferable to encounter this arduous task rather than to undertake to bring Chinese sugar-makers to our mode of working—for so wedded are they to their own manners and modes of doing things, that it is almost a hopeless attempt to introduce a new system among them. The result has confirmed this opinion, for in one week's boiling the klings* who were taken from the field were as expert mill-feeders and boilers as if they had been long experienced in this business, and with this additional advantage over the Chinese, that they work cheerfully, in and out of regular hours, in times of emergency.

Having overcome all these difficulties, it is satisfactory to say that the soil and climate have proved as favorable as had been anticipated for the cultivation of the cane; wherever they have been attended to properly the stoles have averaged ten canes of good size and length, and which have been fit for cutting in one year, from the time of planting. Like all other *planted* canes, in new lands, the quantity of molasses, compared to that of sugar has been large. But the sugar itself, although made in iron pans of the old form and over a naked fire, is of a strong and large grain easily whitened by clay. Therefore so far every expectation has been realized in this new agricultural undertaking, and if in compliance to your wishes I give publicity to a private enterprize, it is with the view of assisting others who may contemplate such works hereafter; and perhaps to fix an epoch in the history of this Island, destined without doubt to be as renowned for agriculture as it is now for commerce."

"*Singapore, 30th May, 1838.*"

XXV.—*Caoutchouc, Dammer varnish, Grass atta, &c.*
Report of the Caoutchouc and Oil-seed Committee, on certain specimens of Caoutchouc, Dammer varnish, Grass and Grass atta, submitted for their opinion.

No. 1. Samples of caoutchouc, collected and prepared in the neighbourhood of Akyab and forwarded by Captain

* Natives of the Coromandel Coast.

A. Bogle, as per his letter to the Secretary, dated March 8th, 1838.—(Submitted April 11th, 1838.)

No. 2. Sample of caoutchouc, presented by Dr. Spry on the part of Lieutenant Wemyss of the Assam Local Battalion, as per Dr. Spry's note to the Secretary, dated April 8th, 1838.—(Submitted April 11th, 1838.)

No. 3. Sample of caoutchouc, prepared under the direction of Captain H. Macfarquhar of Tavoy as per his letter to the Secretary, dated February 21st, 1838.—(Submitted March 14th, 1838.)

No. 4. Specimens of dammer varnish, forwarded by Captain Macfarquhar, and referred to in the same communication.—(Submitted March 14th, 1838.)

No. 5. Specimens of grass and grass attā, received from Mr. Veterinary Surgeon Hulse of Muttra, as per his letter to the Secretary, dated April 6th, 1838.—(Submitted May 9th, 1838.)

The Committee having examined the several samples sent by the Secretary, report as follows :

No. 1. Samples of liquid matter in small earthen pots, received from Captain Bogle. The Committee are unable to give a favorable opinion upon these, and it is difficult to say whether the substance is caoutchouc. Captain Bogle informs the Society that he was trying to get gums of all kinds, and had collected a hundred pots of all sorts. Captain Bogle sent only such as appeared to him to be most like caoutchouc, but does not state from what tree the substances sent were drawn. Captain Bogle, it appears, was in communication with Captain Jenkins, Lieutenant Vetch, and Dr. Scott, and may be able to send more satisfactory evidence of the existence of caoutchouc in the forests round about Akyab, and to transmit it in a more matured state.

No. 2. A sample of caoutchouc, presented by Dr. Spry on the part of Lieutenant Wemyss of the Assam Local Battalion. In the mass this lump looks well, but it is void of elasticity, being, with exception of the outer coat, almost crumbly; the gum seems pure, and free from particles of foreign matter, which go far to deteriorate the price of the

best gum in the English market. The Committee are of opinion that the gum sent by Lieutenant Wemyss, if prepared according to the rules laid down by the London Caoutchouc Company, would bring a fair remunerating price in England. In its present state it is useless.

No. 3. Sample of caoutchouc, prepared under the direction of Captain Macfarquhar of Tavoy. A very fair sample, and with care in preparing it would be equal to the best South American. Captain Macfarquhar states, that it is procurable in the greatest abundance.

No. 4. Specimens of dammer varnish, forwarded by Captain Macfarquhar, produced by a bee on the tree which gives the same resin.

The Committee cannot do better than annex the opinion of Professor O'Shaughnessy on this subject, in his own words.

“ This substance is *wax*, scarcely differing in the least degree from the common substance of that name, at least as far as its chemical properties are concerned. It is soluble in the same liquids, similarly affected by alkalis, fuses at the same temperature, &c. It is consequently inapplicable as a varnish, though from its great degree of transparency when properly purified, a cunning candle-maker might turn it to the manufacture of ‘ diaphanous’ and ‘ shadowless tapers.’ ”

No. 5. Specimens of grass and grass atta, forwarded by Mr. Veterinary Surgeon Hulse, of Muttra.

These samples are rendered interesting as subjects of inquiry, being substitutes for bread in those parts of India suffering under the awful dispensation of famine. Mr. Hulse states, that it was at Julaisur, in the District of the Collector of Muttra, he first saw this article and procured samples for the purpose of submitting them to the Society, and for the inspection of the Inhabitants of Calcutta. On these substances, Mr. Hulse adds, the natives in this part of India are in a great measure subsisting. Your Committee beg to annex Professor O'Shaughnessy's analysis of this food.

“ The *ATTA*, No. 1, contains in 100 parts :

A { 58 soluble in water,
3 soluble in spirit,
and B 39 not soluble in these fluids.

“ The soluble matter A consists of starch, gluten, a trace of gum and of sugar, and consequently may be regarded as highly nutritious.

“ The insoluble part B, is chiefly woody fibre, unfit for the sustenance of man or beast.

“ The *BOOSAH*, No. 2, contains in 100 parts :

A	Soluble in water, consisting of starch, gum, mucilage and a trace of sugar,	21
	Soluble in spirit, viz. gluten and resin,	3
B	Insoluble in the preceding fluids, and com- posed chiefly of woody fibre,	76

Total, . . 100

“ The remarks applied to the *Atta* are proportionably suitable to this substance. It is but poor provender, yet no despicable resource in famine.”

N. WALLICH, M. D.

F. CORBYN.

W. B. O'SHAUGHNESSY.

J. P. MARCUS.

JOHN BELL.

Calcutta, July 6th, 1838.

XXVI.—*Cotton.*

Report upon sundry samples of raw cotton, the produce of Delhi, Allahabad, Beerbhoom, Cuttack, Cossipore, Soonderbuns, Akyab, and Singapore.

No. 1. Samples of Upland Georgia and Sea Island cotton produced at Delhi, by G. H. Smith, Esq. as per letter to the Secretary, dated 8th and 18th May, 1838, viz.

A. Sample of U. G. cotton No. 2, grown at Delhi in 1837.

B. Sample of U. G. cotton No. 6, grown at Delhi in 1837.

C. Sample of U. G. cotton grown at Delhi, and gathered on May 18th, 1838.

D. Sample of Sea Island No. 3, grown at Delhi in 1837.

No. 2. A *small* sample of Sea Island cotton grown by T. O. Crane, Esq. at Singapore.—Letter May 11th, 1838.

No. 3. Sample bale (and sample of such bale), the second crop from plants of Upland Georgia cotton, grown by Dr. C. Huffnagle at Cossipore, from seed imported by the Society in 1836; and being a portion of 400 plants.

See Dr. Huffnagle's letter of 30th May, 1838.

No. 4. Samples of cotton, the produce of the Branch Society's garden at Beerbloom, as per Mr. Secretary James Anderson's letter, dated June 6th, 1838,—viz.

1 Sample of Upland Georgia cotton.

1 Sample of new Orleans cotton.

1 Sample of Sea Island cotton.

No. 5. Samples of cotton grown by W. Lambert, Esq. of Allahabad, as per particulars from that gentleman, contained in a letter from R. Lowther, Esq. dated May 20th, 1838,—viz.

1 Sample of Upland Georgia cotton.

1 Sample of New Orleans cotton.

1 Sample of Sea Island cotton.

No. 6. Sample of cotton, the produce of Akyab, referred to in a letter from Captain A. Bogle, dated March 8th, 1838.

No. 7. Sample of Upland Georgia cotton produced at the Branch Society's garden, Cuttack, as per Major Syer's letter of the 4th May, 1838.

No. 8. Sample of cotton, grown by G. A. Prinsep, Esq. from Peruvian seed, (received from the Society,) in the Sooderbuns.

REPORT.

No. 1. A and B. Samples of Upland Georgia cotton, grown by G. H. Smith, Esq. at Delhi in 1837, are in the opinion of your Committee very fair specimens of Upland Georgia not equal to the produce of North America, but this apparent deterioration may have arisen from the age of the seed, and the difficulty of ascertaining the proper season for sowing this description of cotton in India.

C. Is a sample of the same cotton grown in 1838, but Mr. Smith does not state whether from the same plants, as the former year, cut down, or from their seed; and this is important to know, since in the opinion of your Committee the produce of 1838 is *better* than that of 1837, shewing that the first year's seed was old and probably planted out of season, and that the second year's produce was either the spontaneous crop, which came naturally into season from the old stock, or that it is the produce of fresh seed, planted at a proper time. These are points to which they would wish to call Mr. Smith's attention, and as that gentleman appears very anxious to have an opinion upon the samples sent, they doubt not he will be equally desirous of satisfying the Committee on these points.

It is satisfactory to observe that the second year's produce is *better* than the first, a fact which is contrary to the opinions of some that American cotton will deteriorate.

D. The Committee suppose there must be some mistake about this sample. It is not *Sea Island*, differing essentially from the sample *pod* which is very fine *Sea Island*.

No. 2. The sample sent up by Mr. Crane of Singapore, augurs favorably of that Island for the growth of the *Sea Island* cotton. It is a very fair specimen, and the Committee look forward with anxiety to the report Mr. Crane has promised to make very shortly upon all his experiments, with the different varieties of cotton, in Singapore.

No. 3. Sample of a small bale of Upland Georgia cotton, the *second* crop from plants grown by Dr. C. Huffnagle at Cossipore from seed imported by the Society in 1836.

Your Committee are unable to include Dr. Huffnagle's opinion upon this sample, as he declines giving any; but they have not the less hesitation in saying that it is one of the finest specimens that has been submitted to the Society, and as the grower has presented a goodly sample bale, the Committee are of opinion, in reference to the discretion given them by the Society, that it should have the benefit of the judgment of experienced brokers in England, and have accordingly requested the Secretary to send it to the Committee of Agriculture and Commerce of the Royal Asiatic Society of Great Britain, with a copy of Dr. Huffnagle's letter.

Meanwhile, the Committee may remark this is the second example in the present report of the *second* year's crop being better than the first, thereby leaving good ground for hope, that under proper management the Upland Georgia cotton will become a valuable staple in India.

Your Committee cannot overlook a circumstance, noticed in the letter of G. H. Smith, Esq. to the Secretary, dated 8th May last. That gentleman states, that Colonel Skinner, who has an extensive cultivation of Upland Georgia cotton, does not think favorably of the produce, from the result ascertained of a consignment sold in the Calcutta market, "*which was about the same, as what good country cotton realized;*" and your Committee regret exceedingly that Colonel Skinner's opinion should have been advanced on such frail grounds, and that the Society should not have been favored with samples of such produce. The Calcutta market can be no criterion, and the very same argument might be applied to the test of the Calcutta market for the best Muscavado sugar, and the best caoutchouc; neither of which articles will find favor here until their prices be established in Europe, as parties here are interested in keeping down the prices of staples; while in England, competition soon draws out their good and bad qualities, and either sinks them below the average of similar products, or raises them to a corresponding scale above them; and the

probability is, that had Colonel Skinner shipped his Indian Upland Georgia cotton direct to Great Britain, the result would have been different from that ascertained by actual sale in Calcutta.

No. 4. Samples of Upland Georgia, New Orleans and Sea Island cottons, produced in the Branch Society's garden at Beerbhoom.

1st. Upland Georgia. The Committee consider this sample to be good, fine, silky, rather short staple, strong.

2nd. New Orleans. The best sample of this sort of cotton which has come under their notice.

3rd. Sea Island. Very short staple; and *if* Sea Island, *greatly* deteriorated.

No. 5. Samples of Upland Georgia, New Orleans and Sea Island cottons, grown at Allahabad.

1st. Upland Georgia. This is the best of Mr. Lambert's samples, of fair quality.

2nd. New Orleans. Pretty fair, but not equal to the same variety cultivated at Beerbhoom.

3rd. Sea Island. Degenerated.

Mr. Lambert states that some Peruvian cotton seed was also sown, but did not vegetate.

The Upland Georgia has here established the character of being the hardiest plant. It suffered less than the others from frost, and its produce was as 2 to 1 of New Orleans.

The Committee beg leave to quote the particulars of this experimental cultivation, in Mr. Lambert's own words, and would be glad if others interested in trying experiments would be as concise as this gentleman, who appears to have bestowed much attention upon the subject.

“ On 29th July, 1837, when the first rain fell, I sowed about a cottah of ground composed of reddish clay mixed with kunkur, with

No. 1. Peruvian cotton seed, which did not vegetate.

No. 2. Upland Georgia seed.

No. 3. Sea Island ditto.

No. 4. New Orleans ditto.

“The plants from No. 2, flourished and attained the height of about 3 feet, the blossoms had a healthy appearance, and the pods were numerous and full. The produce began to be fit for gathering early in December. In January the plants suffered severely from frost, but not so much as those from Nos. 3 and 4. The greater part of the plants are still flourishing—1st April, 1838. I send the produce of No. 2, weighing 2 srs. $4\frac{1}{2}$ chts. from a quarter of a cottah of ground.

“The plants from the July sowing of No. 3, were almost all destroyed by frost, and I have none of the produce worth sending; but I send a small quantity, produced from the same seed, sown in the same ground in December, 1836, and which was gathered in the end of November, 1837.

“The plants from No. 4, as well as those from No. 3, were generally stunted and had not the same healthy appearance as those from No. 2. The produce began to be fit for gathering in the middle of November. In January the plants were almost all destroyed by frost before the whole of the produce was ripe. I send the produce of No. 4, from about half a cottah, weighing 2 srs. $2\frac{1}{2}$ chts.

(Signed) W. LAMBERT.”

“Allahabad, April, 1838.”

No. 6. Sample of cotton, the produce of Akyab. A harsh, woolly, short staple.

No. 7. Sample of “Upland Georgia,” the produce of Cuttack.

A very poor specimen that appears to have been neglected, and carelessly picked.

No. 8. Sample of Peruvian cotton.

This is decidedly a superior article, the staple is long and strong, though a little harsh.

The Committee regard this as a very fine description of

cotton, and would recommend that it be tried upon a large scale, if seed can be obtained.

(Signed) CHARLES HUFFNAGLE.
WM. STORM.
JOHN BELL.

Calcutta, July 25th, 1838.

XXVII.—Foreign Cotton.

Report upon certain Samples of Raw Cotton, the produce of Egyptian, China and South Sea Island seed, grown at Hazareebaug, Meerut, Dacca, and at Tavoy.

No. 1. Sample of black seed cotton grown at Hazareebaug, from seed furnished by the Society as per Baboo Rajkissen Mookerjee's letter to the Secretary, dated February 22nd, 1838.

Nos. 2 and 3. Samples of Egyptian and Nankeen cotton, grown at Meerut by the Agricultural Society of that station from seed furnished by this Society.

Referred to in Mr. Secretary Cope's letters of 11th and 31st March, 1838.

No. 4. Sample of cotton grown at Tavoy from seed raised there. Captain Macfarquhar in his letter to the Secretary, dated 21st February, 1838, remarks: "The cotton in which the things (alluding to samples of resin, &c.) are packed, is grown in my garden from seed raised here. It is the *South Sea Island*, and from several trials I have given in different places, I am quite satisfied that it will thrive well here, and we have abundance of spare ground for any person inclined to try it."

No. 5. Samples of cotton grown at Dacca, by Colonel Stacy which he calls "*Stacy Cone*."

Referred to in Colonel Stacy's letter to the Secretary, dated April 15th, 1838.

REPORT.

Your Committee have attentively examined the several samples of raw cotton submitted for their opinion, and have to report as follows.

Sample, No. 1. This sample merits special attention, for three reasons.

1st. Because it has been grown by a highly intelligent native gentleman.

2nd. Because it is the *first* specimen of foreign cotton, grown by a native gentleman.

3rd. Because its quality is so superior, as to have led the Committee to suppose it the produce of "*Sea Island*" seed, whereas it is that of "*Egyptian*," and estimated by your Committee to be worth in England from 1s. 4d. to 1s. 6d. per lb.

It is not the province of your Committee to do more than give an opinion upon quality, but when they consider, that the success of introducing superior stapled cotton on an *extensive scale* depends materially upon the example set by Europeans, and still more especially on the example of intelligent and influential native gentlemen, they would be omitting a most pleasing task did they hesitate to bring prominently to notice, the praise-worthy exertions of Baboo Rajkissen Mookerjee, who, nothing daunted by the failure of other sorts of cotton seed sent him at the same time, repeats his application in February last, with a view to induce some zemindars to co-operate with him in spreading the cultivation of foreign cotton.

Your Committee are of opinion that the letter of advice received with this specimen is worthy of record, and accordingly annex a copy.

To JOHN BELL, Esq.

Secretary, Agricultural and Horticultural Society, Calcutta.

SIR,

The bearer of this will deliver you a small quantity of cotton, part of the produce of seeds you were kind enough to send me last year.

You sent me three different sorts of seeds, all of which had vegetated, but with the exception of that of plain black seed, all others died without any apparent cause. I have now with me a small quantity of seeds, but will feel obliged if you could spare me a small quantity of small plain black seed, (I forget its name,) or any other sort that you can conveniently spare, as some zemindars here are disposed to try the experiment with me, and I wish not to disappoint them. I have still some plants in my garden with pods, they have grown up to the size of from 3 to 5½ feet, and the pods are twice as large as those of the country.

If the American cotton could be introduced here to any extent, it would be of some benefit to the people as very little cotton is cultivated here except a little quantity of a coarse kind in the jungles.

I am, &c.

(Signed) RAJKISSEN MOOKERJEE.

Hazareebaug, February 22, 1838.

Samples, Nos. 2 and 3. These as shewn above, are from Egyptian and China (Nankeen) seed.

The first is a fine stapled cotton, equal to the finest Egyptian, and we reckon its worth in the English market at from 11*d.* to 13*d.* per lb.

The second is a good hardy staple, and appears to have recommended itself in many parts of India, although it does not appear to be cultivated yet to any extent, and this may in some measure be attributed to its *brown* colour, which is not unlikely to acquire a prejudice until its value be developed.

Sample, No. 4. Captain Macfarquhar, states that this cotton is from *South Sea Island seed*, and the Committee

regret that a small quantity of the seed did not accompany the staple, as many parties have called the *Sea Island* of America, the *South Sea Island* cotton and vice versâ, thereby leading to much confusion.

The sample sent by Captain Macfarquhar appears to be of a quality resembling the *Sea Island*, but finer and more silky, and the fibre not so strong, its value is not so easy to determine, but the Committee are of opinion that it would sell for a high price.

The absence of seed disconcerts your Committee. The Pernambuco cotton, which it is believed, is the same as the *South Sea Island* cotton, is an inferior staple to that of the N. American *Sea Island*, and they have a sample of cotton submitted, which in point of *fineness* surpasses the genuine *Sea Island* cotton of N. America.

This improvement on the general staple of Pernambuco cotton might be reconciled had it been produced *at a distance from the sea*, since it has been ascertained that this description of cotton deteriorates by proximity to the sea; whence your Committee are disposed to think that Captain Macfarquhar has been led into error in calling it *South Sea Island* instead of *Sea Island*, and will be glad to have this question solved, since if it be (as your Committee suspect) *N. American Sea Island*, there is abundant hope that in many parts of our territorial coasts within the limits of the Bay of Bengal, the *Sea Island* cotton may be cultivated as successfully, and of equal quality, as that which comes from N. America, and as yet stands No. 1 in the cotton market all over the world; since we have a greater range of coast, admirably suited for the growth of cotton, say, Chittagong, Arracan, Ava, Martaban, Tenasserim, on one side, and Cuttack, the northern Circars, and the Carnatic on the other, not excepting Ceylon and Singapore.

Sample, No. 5. This specimen, Colonel Stacy denominates, "Stacy cone," but it is too small for purposes of comparison; the staple is long and fine, and would fetch (such cotton as the sample), from 11*d.* to 13*d.* per lb in the English market.

This is the Pernambuco cotton, and its fineness verifies the fact that its staple improves, as the Planter recedes from the influence of the sea.—It is a hardy full-bearing plant, and is likely to answer well in India on an extensive scale.

G. U. ADAM.

D. B. SYERS.

JOHN BELL.

*Agricultural Society's Office,
Calcutta, July, 1838.*

XXVIII.—*Upland Georgia Cotton.*

The result of Colonel Skinner's experiments at Hansi.

[Extract of a letter from the Secretary to Colonel Skinner, dated Calcutta, July 26, 1838.]

“I lately received a letter from Mr. Smith of Delhi, in which that gentleman, while speaking of experiments in cotton, casually mentions the disappointment you have experienced in the same field with the ‘Upland Georgia’ of which you had an extensive cultivation, and if I understand Mr. Smith rightly, your disappointment is based upon the account sales of your cotton in the *Calcutta market*.

“I have been long most anxiously looking for some information regarding your experiments, and I was much mortified to hear that you had not only gleaned a crop, but had sold it in Calcutta.

“I felt mortified on two accounts: Ist, in not having been favored with samples of your plantations; and next, that you had adopted the expedient of realizing a sale here.

“But what has caused me more uneasiness than either these, is the effect which such discouraging price has had upon your hopes of introducing a better staple, and the influence which your opinion must have in deterring others from persevering in what they have began, or in beginning what you, I fear, have ceased to persevere in.

“It appears to me that you have not given your new cotton a fair trial, and that if you had sent it to *England*

direct, you would have reaped better returns, than in Calcutta, and I ground my opinion upon the circumstance, that had your cotton been equal to the *first quality American*, the result of a sale in this country would have been the same, in as much as it was a *new* article." What would be the result of a consignment of the best caoutchouc sold in Calcutta, or of the best Muscovado sugar?

"But I have been sorely disappointed that under any circumstances, you have not favored the Society with samples of your cotton, and particulars of cost: seasons of flowering and bearing; the produce per beegah, and net price realized in Calcutta. Such particulars would have been invaluable, as the Society would therefrom have been able to draw some useful inferences. It may not be too late, and I need not add that you will be conferring a favor, by affording such particulars as your experience has placed at your disposal. Perhaps you could at the same time oblige me with a sample of the cotton which was sold in Calcutta, and say whether you have abandoned the cultivation of Upland Georgia cotton."

Colonel SKINNER's reply to the Secretary, dated Hansi, August 9th, 1838.

[Read 12th September, 1838.]

I was favoured with your letter of the 26th ultimo yesterday, and beg to inform you that had I met with success I should not have failed to have informed you of my exertion of the cotton. I commenced here with 182 biggahs of cotton in 1836, and enclose you the statements,—1837 and 38, both years of severe drought, so nothing has been tried. I have sent seed to Mr. Smith and Colonel Young in Derah Dhoon, and I hope they will succeed better. This country here I am afraid will never answer for cotton and sugar, but I am determined to give another trial next year should we have a good season. My reason for sending the cotton to Calcutta was just to see what was the difference of price it fetched between country cotton, which is sown at half

the expense of the other, and if it does not yield better prices the natives will never take to it. I have also sent the seed into the Doab to my jageer ; but as yet I have not been able to persuade the natives to do any thing, but that is more on account of the severe drought they have experienced, and the call of Government to pay the whole juma for which the poor zemindars have sold their bullocks, and I may say their children to pay up their juma, and now are left from hand to mouth ; so these experiments which cost a great deal of money, cannot be carried on with the poor natives ; and unless they take to it nothing great will be done by one or two individuals who can afford to make these trials, but I want that it should spread amongst the zemindars, for which trial I am afraid our Government is not liberal. The rumour of war has now put an end to all my trials at present. I farm villages to the amount of one lakh and 20 thousand rupees per year from Government, and I have been forced to pay the whole amount in hard cash, and have not realized 30 thousand from the produce of the villages. I made an offer to the Board that I should pay 4 annas in a rupee this year and the other 12 annas in 3 years (4 annas a year), paying 12 per cent. with good security, to which they did not consent, and made the whole Doab come down with the whole juma. Now I would ask the Society what cultivators would succeed under such circumstances ? I have only received from my taluoka the 30 thousand, and have now supplied them with bullocks and grain to the amount of 30 thousand more to save them from the severe famine of last year.

I remain, my dear Sir,

Yours faithfully,

J. SKINNER.

P. S. It will never answer for cultivators to send their produce to the English markets ; it may answer in Calcutta, but not here.

UPLAND GEORGIA COTTON.

Statement showing the outlay, and produce of the American Cotton of 1836.
 Hansee, 9th Aug. 1838.

Years.	Number of pucksah beegahs sown.	Produce.			Expenses including all charges.		Sold.				Profit.	Loss.		
		Cotton with the Seed.	Average produce per puc. kah bee-cleaned.	Average produce per puc. kah bee-cleaned, kah bee-gab.	Rs. a. p.	Rs. a. p.	By Messrs. Colvin and Co. at Calcutta.	Cotton Seed.	Quantity of Seed.	Rate per maund.			Rs. a. p.	
1836	192	556 0 0	3 2 4	171 0 0	0 37 9	3,322 9 8	Rs. a. p.	mds s. c.	Rs. a. p.	Rs. a. p.	mds s. c.	Rs. a. p.	Rs. a. p.	Rs. a. p.
1837 &								171 0 0	11 13 0	2,022 0 0	387 0 0	0 15 11	384 0 0	83 6 4
1838														0 0 0

No rain, consequently nothing was sown.

J. SKINNER, Col.

Detail of expenses.

To Cash of ploughing, sowing, weeding, picking cotton, land and water revenue,	1,627	3	0
<i>Dispatching to Calcutta.</i>			
To paid Custom duty,	70	6	7
To paid hackery hire from this to Dehlee and boat hire from Dehlee to Calpee,	220	0	10
To cost of screwing the cotton into gunny bags,	92	0	0
To paid boat hire from Calpee to Calcutta,	197	8	11
To godown hire, commission, and postage of letters,	115	6	4
		695	6 8
Total rupees, . .	2,322	9	8

J. SKINNER, Col.

XXIX.—*Diseases of horned Cattle.*

Account of a disease termed Goorgoora or Naharrooa, with which cattle in the district of Dorunda Chootiah Nagpoor have been afflicted throughout the hot season of 1837-38.—Communicated by W. Dunbar, Esq. Assistant Surgeon, Ramghur Light Infantry, in a letter to the Secretary, dated 30th June, 1838.

[Read 11th July, 1838.]

I beg leave to send you the following sketch of a disease, which during the two past hot seasons has been very prevalent among the horned cattle in this neighbourhood. It is called by the Coles *goorgoora* or *naharrooa*, and by the people in cantonments *khora*. The animal affected with this disease is first of all observed to become dull and listless, refusing his food, with a hot skin and considerable thirst. The

salivary secretion is augmented and the gums are inflamed and swollen. There is a constant discharge of frothy liquid from the mouth. These symptoms generally disappear in a greater or less degree after three or four days, and then the animal, much reduced and emaciated, is observed to be lame from ulceration having taken place in the *sulcus* or hollow between the hooves. He makes constant efforts to lick these sores with his tongue. Neglect of these ulcers is speedily followed by sloughing of the hoof. Sometimes the four feet are attacked at the same time, sometimes only one or two suffer. The disease has been fatal in a good many instances, particularly where weak and sickly cattle were attacked.

The disease varies in duration according to circumstances, such as the previous health of the animal, the nature of the remedies applied, &c. &c.; but whether the recovery be speedy or otherwise, no animal I am informed regains his full strength until several months have elapsed from the date of the attack.

The following is the mode of cure adopted by the Coles and practised with success in cantonments, when the gun-bullocks of this battalion were taken ill.

During the first, or as it may be called the feverish stage, nothing is done beyond supplying the bullock with as much water as he chooses to drink, keeping him in a cool and airy situation, and cleansing his mouth from the quantity of frothy mucus which is constantly accumulating. As soon as the sores on the feet have manifested themselves, they are washed four or five times a day with sand and water. This is done in a very coarse and rough manner, as if the great object were to excite as much irritation as possible, and to prevent the formation of cicatrices.

The juice of the berry called here *bailewa* (*Strychnos nux vomica* (?)) is then applied to the sores. Its application frequently repeated, appears to cause much pain at first, but it seldom fails in producing a cure.

I may remark that a Neelghye, at Dorunda, is at present labouring under this disease in a severe form.

XXX.—*On the Capabilities, Topography, and great Natural Resources of the Tenasserim Provinces, with a memorandum of the advantages which they hold out for English Colonization.*

1.—*Report of the Tenasserim Provinces. By Dr. HELFER.*

2.—*On the Agricultural Capabilities of Amherst Province. By Mr. RILEY.*

3.—*Remarks on the advantages which the Provinces afford for the cultivation of coffee. By Mr. RILEY.*

[Dr. Helfer's paper read Sept. 12, 1838.]

In publishing the results of my examination of the Tenasserim Provinces, now permanently annexed to the British empire in the east, I have endeavoured to show the great value, which they ought to possess in many respects in the eyes of a fostering government.

It is my intention to draw attention to this hitherto neglected quarter, as far as it can be interesting and useful with reference to the promotion of the Agri.-Horticultural Society's views and purposes, which are the advancement of the benefits of European civilization in general, and the promotion of an improved Agriculture and Horticulture in every part of British India.

To render my exposition short but intelligible, I divide the subject into the following heads :

1. Can the provinces be of any use at present to the Society ?

2. What can they expect in return from the Agri.-Horticultural Society ?

3. In how far do the Provinces merit the particular attention of the Society, and in how far do they possess advantages superior to other parts of India ?

4. What kind of cultivation is chiefly adapted to their climate and situation ?

No. 1. With regard to the first point I think the provinces can be of little or no use at present to the Society.

It is ascertained that of 30,000 square miles which form the extent of the provinces, scarcely 1500 square miles are under cultivation. That of the rest there are at least 15,000 square miles of the best soil, partly alluvium, partly decomposed humus lying waste, though these are situated on or not far from navigable rivers.

That the country is an almost uninterrupted uninhabited forest.

That the present inhabitants are a careless indolent race, destitute of the desire of improvement.

That hitherto no European settlers have resided in any part of these extensive districts.

That the number of cultivated plants is confined to the small list of necessary articles in tropical climes—and that these productions, because left almost entirely to the care of nature are generally of an inferior description.

In consequence of which the Agri.-Horticultural Society can expect nothing profitable either from the modes of cultivation now carried on,—nor from the quality of articles cultivated there, as samples of superiority to be introduced in other parts.

No. 2. But the less the provinces themselves are able to yield,—the more attention vice versâ ought they to expect from the providing care of the Society—for the less there is yet done to promote an adapted, varied, superior cultivation—the more should the Society take the neglected child under her maternal wings,—and it is for this neglected, almost unknown, child of Asia, that I almost implore the attention of the Society, and will endeavour to prove in the next paragraph that it particularly deserves that care should be bestowed upon it.

No. 3. A. *An unbounded and undisturbed field* for improvement and introduction of every kind of valuable cultivation is opened.

Hundred thousands of acres are laying waste !

Every new tenant can begin at once with the best quality of the productions he intends to introduce.

He can choose in the first instance the very best locality, and will get extensive grants of land for a mere trifle.

He is perfectly secure from all interference or inroads of the surrounding people, for the Siamese, the next neighbours, are very peaceful and timid; the Burmese in the southern parts are too distant, and in the northern too weak to dare to disturb the peaceful proceedings of the cultivator.

He has no fear from the prejudices of the natives, who will remain always neutral, he may therefore begin whatever occupation he chooses.

B. *The Climate* is very healthy, so much so, that the rate of mortality in the European Regiments stationed there has been for a succession of years not only smaller than in any other part of India, but even smaller than in several parts of England.

It should be therefore the resort of Europeans; moreover it is the plan to make experimental improvements, under the conduct of Europeans; it is, then, the place of all others for future colonization,—if such shall ever be carried on in India.

C. *The Locality* is such that it is preferable to the greatest part of India. The bulk of India is an inland country, some portions are distant a thousand and more miles from the sea-coast, comparatively few parts are on or near the great outlets, or on or near the great rivers—while many parts of Central India are isolated, and almost cut off from communication with the surrounding districts.

The Tenasserim Provinces on the contrary are a narrow strip of land from the 17th to the 10th degree of N. Lat. presenting an extent of sea-coast of 480 miles, possessing numerous navigable rivers, communicating with the interior in all directions, with a sufficiency of extensive and safe ports, quite the reverse of the uniform sandy beach of the Coromandel Coast on the opposite side of the bay.

The Tenasserim Provinces are situated between China, the Straits of Malacca and Hindoostan, and any quantity of produce destined for the consumption of the natives can be carried without difficulty wherever it will find a market;

meanwhile the safe harbours ensure shelter for vessels of any tonnage occupied to carry the produce of the country to Europe.

D. *The nature of the Soil* is such, that few tropical countries will compete with it in fertility in general—and for extent of fertile soil. It is a virgin soil—the greatest part left for thousands of years to the undisturbed action of nature or depositing masses of fertilizing matter.

There are no swamps, no deserts, no rock-mountains districts, which swell the amount of land, without being in part available or of precarious use. It may be safely asserted that almost the whole of the sum of land is capable of cultivation, for even the whole of the mountains is an uninterrupted forest, which, decaying for a number of centuries, have covered almost every where the rock with vegetable mould.

There is a variety of land, beginning from the incipient deposits accumulated within the roots of the protecting mangrove forests, ascending to the next division of land, the miry rice fields, coming to the level plains of alluvions along the banks of large rivers, from thence to the inland villages, from these to the gentle slopes of the hills, mounting the sides of the mountains and terminating at the tops of 4000 feet in high ridges, and table lands.

E. *Peculiarities of situation.* But the richness of the soil is not the only recommendation, so also not the latitude, but the geographical position. The neighbourhood of that great natural emporium of Asiatic luxuries *the spices*, that great advantage which the east of Asia possesses in preference to any part of America or Africa in the superior development of nutmegs, cloves, and cinnamons, all of which grow (as far as it is ascertained) freely in the southern parts of Tenasserim.

F. *Unoccupied Lands.* Finally as I have already indicated thousands of acres of the choicest lands are entirely unoccupied, because nobody has yet turned his attention towards cultivation.—Any one therefore desirous to settle

in India, cannot do better, than to select these provinces in preference to all other parts, where already occupied lands involve the necessity of a purchase,—increasing materially the first outlay of capital, and where the European settler, beginning innovations, will be constantly thwarted in his undertakings, by obstinacy, prejudice and that scourge of India—caste—from the part of the natives.

No. 4. We come now to the solution of the question, what kind of cultivation is particularly adapted?

To answer generally—all tropical plants especially such as are peculiar to the East, but, as different individuals cultivate with different purposes and views, it is of great importance to distinguish the cultivation—

1. Which yields the greatest revenue without considering the outlay of capital.

2. Cultivation which yields a return in the shortest time.

3. Cultivation demanding the smallest outlay.

4. Cultivation now particularly in demand.

5. Cultivation yielding the surest percentage.

6. Cultivation yielding a permanent revenue.

Sub. 1.—*The greatest revenue* is to be expected from nutmegs, cloves, gambier, cardamoms, cocoanuts, arecas and bripah which promise under present circumstances to yield when in full bearing at least 50 per cent.—all of which want, however, a greater outlay of capital and patience—on account of the long time before they begin to return.

Sub. 2. Productions yielding in the shortest time.

In this case quite different vegetable productions must be selected; *id est* annuals; and with which the rate of profit will be of course smaller.

Amongst these ought to be counted, rice, ginger, turmeric, castor oil, sesam-oil, tobacco, cotton, Ava hemp, pine-apples, and perhaps indigo and sugar.

Sub. 3. Requiring a smaller outlay of capital, all the plants enumerated Sub. 2, excepting tobacco, cotton, indigo and sugar, which require to be carried on a larger scale to be fruit-bringing.

Sub. 4. Amongst the productions now particularly in demand rice and sugar rank the first, particularly the latter for which the soil seems very well adapted ; so also cotton—and, of daily increasing importance, coffee, which thrives admirably throughout the whole extent of the provinces.

Sub. 5. Regarding the most secure investment of capital we must again subdivide the productions into those suited for the Indian market, and the Europe market. Among those for the Indian market are areca nuts, betel vines, cocoanuts, rice, sesam-oil, durian and mangosteen fruits. For the European market, probably for the next twenty years, sugar, coffee, and spices.

Sub. 6. Finally, amongst the plants insuring the longest and almost permanent profit, must be enumerated, all spices, cocoanuts and indigenous fruit trees.

By this enumeration the foreign cultivator and capitalist can easily perceive, that it very much depends on the views he has, the means he can employ, and the time he will devote to attain his end. Sure enough that he has a wild field opened, and a great selection, that a combination of several productions ensures a certain return in case of the failure of one or the other article, and that the diversity of cultivation permits a vast number of settlers to colonize close together without apprehension, that one will interfere with or ruin the next neighbour.

In this enumeration are not included,

1. The animal productions which only combined with the cultivation of the plants, upon which they feed, can be reared ; such as stick lac, cochenille dye, silk.

2. Articles hitherto neglected in India, such as vanille, cacao, New Zealand flax, gum-arabic, sago, tea, and others of the growth of which we have not yet any experience.

3. Indigenous productions known to be of importance, but not yet cultivated, such as teak-timber, sapan-wood, frankincense from the *Hopea odorata*, the annual camphor plant, caoutchouc, gamboge, wood-oil, black varnish, the wax plant, the native rope tree, the jessamine oil tree, the

cajeputi-oil tree, the sandal-wood, &c., all of which have been found growing wild by me in Tenasserim.

It must appear astonishing that notwithstanding these golden prospects nobody has yet found out this promising land.

This however can be easily explained by stating, that the land has only been opened for twelve years to Europeans, that the Honorable Company's system, till lately, did not sanction European colonization in India, that since this system had been changed, no European, excepting the few who govern the provinces, ever visited any part save the port of Moulmein, and that I have been the first, who traversed the greatest part of the interior.

But if I have been anxious to praise what I found so eminently praise-worthy, it would not be fair to pass in silence over a great objection or rather considerable difficulty, in engaging there in agricultural pursuits.

This is the want of population, in consequence of which the price of labour is very high, besides an indolence and dullness of the labourer, and, if many should engage and want hands, absolute impossibility to find indigenous labourers.

However, this difficulty is not insuperable, nay upon closer inspection easily even to be overcome.

Since the abolition of the African slave trade, this want of labourers is more or less felt in all tropical colonies excepting Hindoostan Proper. And parts of the Indian Archipelago, and the Isle de France, Demerara, Port Rico, &c. are on the same footing with the Tenasserim Provinces.

Hence the origin of the Coolie system. If Coolies be exported to America it would suggest itself to the superficial observer, that Coolies ought to be also introduced into Tenasserim.

But I am no advocate for the Coolie system. Without entering into the question if it is or not a modified slave trade under a new form, I do not like the weak race of Hindoos, out of their element when not in Hindoostan; and who are never reconciled to their fate if removed from their

manes and lares, and I find superior labourers in another quarter. I mean the hardy industrious Chinese, who emigrate annually in thousands, and disperse themselves in the first instance in the Indian archipelago, without knowing where to put their head.

These can be imported from Singapore at a moderate rate in the beginning, and should European enterprize turn itself into this new channel, they would, by their own impulse, flock into these new provinces. What would in general be most profitable.

1. The operation of a single farmer,
2. A combination of a Company, or
3. A regular system of European colonization, to benefit the country and to render the provinces a most valuable part of British India? This, able political economists, time, and experience must decide.

I, for my part, am only desirous to excite the attention of Government, and of the public, and of this Society toward this quarter—and, as waiting for future generations to do good when you have the power to do good now, would be rather blameable, I implore the Society not to wait till the provinces are in a fair way to become a colony, but to do now the best possible in their power, to introduce there so many of their improved productions of tropical cultivation as possible and amongst these chiefly the Otaheite sugarcane, Virginia and Havanna tobacco, Manilla and Egyptian cotton, and Mocca coffee.

2.—Remarks on the Agricultural Capabilities of the Province of Amherst for the production of Coffee, Sugar, and other articles of Commerce. By Mr. EDWARD RILEY.

As it must be a desirable object on the part of Government to ascertain the value of the uncultivated lands under their control, and as Agriculture has of late taken a prominent place in the proceedings of those Societies having the public

good at heart; it will be the purpose of the following remarks to point out the extent of such lands in this Province, their adaptation to the particular kinds of tropical productions stated, and the practicability of rendering them available for such productions.

The staple articles of Coffee and Sugar will have particular attention, as experience shews that the lands have evinced a suitableness for the production of these articles, not excelled by any other place of cultivation in the East. Besides these however, Cotton, (of particular description,) Pepper, Gambier, Ginger and several articles of minor importance are also adapted to the lands and will doubtless, in course of time, form articles of export from this coast equal in quantity and quality with those of the ports in the Straits of Malacca.

Without a survey it would be impossible to give any thing near a correct statement of the extent of land available out of these immense alluvial plains, which (with the exception of the part appropriated to the cultivation of paddy) are sufficiently high to escape inundation during the rainy season; but in an area so extensive a sufficient quantity would doubtless be found to rival in its productions the exports of the Mauritius.

The qualities of these lands are superior in many respects to those appropriated to the cultivation of Coffee and Sugar which have come under my notice in the Island of Java; the forests, or that part adapted to the former cultivation, possessing a deep rich alluvial soil unmixed with stony particles, and affording sufficient shade, so as to render unnecessary the removal of any thing further than the low brushwood and creepers, which being comparatively thin it would require but little labour to effect. The plains adapted to the latter article are composed of the accumulated *humus* of ages resting upon the pure alluvion of the tides, and from the annual deposit of the rank vegetation with which they abound, have attained a height uninfluenced by either tides or rains of the monsoon, presenting one inex-

haustible soil for the cultivation of sugar, which (the difficulty overcome of eradicating the present covering), would produce (as is the case with all new lands), a large average for the first crop, and with due care the usual succession of return crops.

For Cotton of the annual kind and probably several other descriptions not yet tried, sites present themselves in the vicinity of the neighbouring hills; in fact the lower jungles are from their loose formation and having a due mixture of sandy and saline particles admirably adapted to this article. I have met with several plants of the Pernambuco kind in these situations, having been placed there by the natives, and certainly better specimens both in regard to appearance and production could not be desired.

The fact of a trial having been made to introduce this description of cultivation which resulted unsuccessfully cannot be advanced as an argument against its suitability to the soil; the cause of the failure in question was attributable to a misjudgment in the absence of proper information on the subject as to the kind of soil best adapted.

The great objection and in fact the only obstacle to an extensive cultivation of articles requiring considerable attention and labour is the paucity of inhabitants, and consequently the high rate of labour attendant thereon. This is so material a point, that persons having agriculture in view would be induced from the circumstance to forego their views rather than embark in such an undertaking;—to obviate this as much as possible, and benefit the Provinces in general, I have in view a plan for importing Chinese labourers, the terms of which will be found in the sequel embodied in the calculation for conducting a Sugar plantation.

The number of Chinese emigrants arriving annually at Singapore by the Junks from Canton and the different Ports on the East Coast of China, amount to several thousands, besides a large number by the Portuguese Vessels from Macao; the principal part of the latter being artificers. On

their arrival at Singapore their object is to get engaged for a term of one, two or three years according to circumstances, which enables them by obtaining an advance to pay their passage, and remit a small amount to their parents by return of the vessel. Considerable numbers find employers immediately on arrival, then procure the advance of 10 or 12 dollars and become domesticated at once in the household of the party to whom they are under engagement. The less fortunate are left to do the best they can, and in the course of a month, generally distribute themselves throughout the Malayan Archipelago wherever an inducement offers. I have repeatedly been witness to the fact of the Chinese coolies of Singapore on the arrival of the annual Junks from China, assembling in a body on the wharfs to oppose the landing of their emigrating countrymen. Such being the case there exists not the semblance of a doubt but that any number would be induced to come here on the terms I have stated. This system once put in force would be followed up by annual supplies and in the course of a short period the existing difficulty so generally complained of would be entirely removed.

Another important point to be considered well worth the attention of Government is, that of a direct trade with the China Junks by establishing in Maulmain a mart for the various descriptions of articles well suited to their demand ; these consist principally of Birds' Nests, Birds' Feathers (wings of the blue jay and skins of the kingfisher so common on this coast), Sharks' Fins, Beche de Mer, Orpiment or Hartall, Cutch and several other descriptions of Burmese and Bengal productions, besides European manufactures, principally woollens, which are procurable in the Maulmain bazar as cheap, if not cheaper than in the Straits, being derived from the large stocks in Calcutta daily selling by auction. This carried into effect would be an inducement too great to be rejected, and where no duties are levied surely the preference would be given to this port to that of Batavia to which they proceed at considerable risk of navigation down the Straits, and

at a large expense of port charges, duties, &c. merely to secure the above enumerated articles for their return cargoes.

A company formed among the capitalists of Bengal (should it not be the object of Government), having in view Agriculture and this trade combined would, I am convinced, prove eminently successful and confer a blessing on this hitherto neglected coast.

Again, in the event of such trade being opened, the emigration to these provinces will increase in proportion to the prosperity attending it, and many individuals will locate themselves in the unreclaimed jungles and plains for the purpose of cultivating such articles of general consumption as require little else but the labour attending the cultivation to bring them to maturity; and, as this should be encouraged as much as possible, liberal land regulations should be instituted which would tend to induce their more wealthy countrymen to enter with spirit into speculations of the kind, who would for their own interest encourage emigration and in all human probability, in due time rival their wealthy countrymen the landed proprietors of Java.

I have been induced to dwell at some length on the foregoing subject, considering it as the ground-work upon which to raise a successful cultivation, without which the land must lie in its present wild state, until time shall have peopled it to an extent that will cause a change in the disposition of the apathetic Burman, and drive him from his present state of indolence to seek his subsistence (as a dernier resort), by the culture of the land upon which he resides. All existing circumstances considered, the conclusion to be made is, that those products only which require the least labour and expense in their cultivation should, for the present, form the subject of experiment, and as coffee is an article of this description, I shall now proceed to state the progress of a small plantation of the article planted, as an experiment, from seeds which I brought from Java, for the purpose, 14 months ago.

By entering into details all doubts will be removed, while the facts will be of service to those who may have a similar object in view. During a tour through the Western districts of the island of Java in the latter part of 1836, I made a point of inspecting the particular district of Bandong situated in the Preanga Regencies in which by far the greatest part of the Java coffee is grown. The object I had in view was to ascertain the nature and properties of the soil so as to compare them with the general appearance of the soil on this (the Amherst) coast of which I had made myself acquainted at a previous visit. The resemblance both in point of climate and soil between the two countries induced me to obtain the best information on the cultivation and so on. Being on the point of returning to the Straits I procured a quantity of seed of the best quality. These I packed in cases in alternate layers with wet soil intervening and in this state it remained during an interval of three months until my arrival at Maulmain, being anxious to sow them in a nursery as soon as possible the proper season for doing so (the commencement of the rains) having arrived. This was at once accomplished through the kind assistance of Mr. Blundell. On opening the packages the seeds were found in capital condition. They had commenced to throw out shoots which the dampness of the earth had effected by excluding the air. Had they been dry packed the probability is that all would have been destroyed. A very short time elapsed before the sprouts showed themselves, producing about 2,500 young plants which were allowed to remain in the nursery until the approach of the following wet season, about 11 months. In the interim I selected a spot of ground near Amherst, having a slight elevation and of middling quality of soil, and with the object in view of ascertaining how the plants would thrive with the least possible attention, the jungle and creepers were cut down, together with such trees as were not required for the purpose of shade, collected and burnt on the spot. Without working the soil on the approach of the last rains

(May) the young plants were taken from the nursery and transferred to this spot, together with about 2,500 weakly plants procured from Penang a short time previously. They have been weeded only once, and notwithstanding the unusually wet season which has occurred, they have progressively thriven, averaging in height, at 15 months about two feet with a luxuriant appearance, and they are already as far advanced as older plants on the best plantations in Java. I have stated that the soil of the jungle in which the above were planted is but of middling quality: within the last month I have discovered sites for coffee requiring even less trouble to prepare than has occurred in the present case, and possessing a soil infinitely superior, comprising an area capable of containing a million of plants. It is worthy of remark that the coffee plant becomes acclimated to this coast. From specimens now in bearing I find that the berry is prevented from ripening *during the rains*, on the cessation of which however, the fruit is at once brought to maturity. An advantage not enjoyed in the plantations in Java, is thus ensured to the Amherst coffee planters; namely, that of a regular dry season in which to cure the fruit without fear of rain.

The most material point to be ascertained is that of the outlay required for a plantation of any considerable extent, and as the expense incurred in the foregoing statement affords in some measure a foundation for a calculation, I have used it in the following estimate. To prevent exaggeration and provide against casualties I have stated the amount of produce considerably below the usual average rates, and of expectancy.

For cleaning jungle, enclosing and planting 5,000 plants the amount of outlay was Co.'s Rs. 200, in doing which seven men were employed two months and 10 days.

Outlay. Income.

At the above rate it would require 40 men for 4	
months to prepare and enclose a plantation and	
plant 100,000 trees—40 men at 12 Rs. per mo.	
4 months,	2,000 0

	<i>Outlay.</i>	<i>Income.</i>
Expense of procuring seed and plants, and rearing the same, and tools for cultivation, ..	400 0	
3 Men to attend 3 years at 12 Rs. per month, Godown and sheds for preparing the coffee and utensils for same,	864 0	
To cover expense of Buffaloes, Carts, making roads through the plantation, and headman's wages for 3 years,	800 0	
	1,500 0	
Outlay at the end of 3 years, Co.'s Rs. ...	5,564 0	
First plucking, at the end of the 3rd year at the average of 6 trees to 1 lb. of coffee, 16,666 lbs. or 200 mds. at 12 Rs.		2,400 0
Expense of plucking, curing, &c. and attending trees until 2nd crop, say 10 men 12 months at 12 Rs. per month,	1,400 0	
Second plucking, 4 years after planting at the average of 3 trees to 1 lb. 33,333 lbs. or mds. 406, at 12 Rs.		4,872 0
To cover expense of plucking and curing the above,	308 0	
Which pays for all expenses, Co.'s Rs. ...	7,272 0	7,272 0
Third plucking, would give an average of at least 1 lb. per tree, say 1,220 mds. at 12 Rs. per md.		14,640 0
The same number of men employed for plucking, curing and attending trees,		1,400 0
Leaving a profit of Co.'s Rs.		13,240 0

The following season up to the sixth plucking, the production would increase in proportion without requiring any considerable addition to the expense of attendance for plucking, &c. In the above calculation I have (as before stated) taken the very lowest average for the produce of each tree to allow for casualties. The result however shows the value of a cultivation of the kind now alluded to, and if extended to a plantation of a million of plants, the proportion of

outlay being materially in favor of quantity, then a greater profit will ensue in proportion.

The great inducement which the cultivation of coffee affords is its commercial importance as a staple article of consumption. The enormous increase of its consumption, (which since 1824 when the duty was reduced from 1s. to 6d. per lb. has risen from 10,700,000 lbs. the then amount of *home consumption* to 23,000,000 lbs.) and the inadequacy of the present supplies to meet the growing demand on the continent of Europe as well as in America, combined with its cheapness and the little trouble attending on the cultivation, induce a preference to be given to it above all other articles of tropical agriculture.

Having in a separate paper detailed the treatment of coffee, in the planting of the seed, attendance on it till maturity, and preparing it for exportation, it is here unnecessary to make any further remark on the subject.

The next article in point of commercial importance is SUGAR. I have already pointed out in the former part of these remarks the large extent of lands available for its cultivation. It will only be necessary in continuation therefore to state the result of a small experiment of cane foreign to this coast planted here. Inferring therefrom the success which would attend sugar-cane cultivation on a large scale.

Some time ago a few cuttings of the Otahite cane were obtained from the Botanical Garden of Calcutta, a part of which was planted in ground prepared near the sea, in a shallow soil of an inferior description, some part of which barely covered the under stratum of conglomerate ironstone: they were found, notwithstanding, to arrive at the greatest perfection, averaging in height at maturity about 10 feet. Very few canes were less than 6 inches in circumference, having a copiousness of juice of a strong saccharine quality. These were converted into cuttings and planted in the same locality and are now at the age of *five months* upwards of six feet high and covering 12 to 15 canes from each stole of an uniform luxuriant appearance and of a proportionate thick-

ness. It requires no further illustration than the foregoing to shew the practicability of cultivating the sugar-cane here. Indeed the manner the natives have of cultivating a variety of a very inferior description (called by the Malays the ratan cane from its thickness and strong fibre), would convince any one capable of forming an opinion in this respect. They pay no attention to it after planting. They select a site, generally on the slope of a hill, burn the jungle and merely insert the extremity of the cane or top shoot into the ground in rows. It ripens in the usual time, 14 months; has a large proportion of juice which is converted into sugar on the spot in the rudest manner possible, but which, if properly manufactured, would produce an article equal to any from the East Indies.

The following calculation is concocted from the best authority I could obtain on the subject of the actual outlay necessary; besides which, however, I have taken into account the difference in point of labor between Java and this coast and have allowed for it accordingly.

*Calculation for a Sugar plantation to contain 500 acres
worked by Chinese, shewing result for 18 months.*

60 Chinese coolies procured from Singapore, their passage from China paid them, say Sp. dol. 10 per head, 	600	
Their passage from the Straits to this place Sp. dol. 6 each, 	360	
Further advance to them to erect houses, &c. on arrival, say Sp. dol. 8 each, 	480	
The above advance taken into consideration, it is usual with the Chinese emigrants to enter into agreement to serve for a period of three years at from 2 to 3 Spanish dollars per mo. in the Straits, say here Sp. dol. 4 per mo. 60 men 18 months at Sp. dol. 4 per month each,	4,320	
One China overseer or superintendant, Sp. dol. 10 per month, 	180	
	5,940	Co.'s Rs.
At the exchange of 212 Rs. per 100 Sp. dol...		12,592

Machinery, Boiling Houses, &c.

A patent vertical cattle mill with vacuum pans for manufacturing the sugar and apparatus complete, price in England, ...	£ 640	
To cover carriage out and all expenses,	50	Rs.
	£ 690 say 7000	
Expense of erecting mill, &c. ...	1,500	
Erecting brick boiling houses, sheds, &c. ...	7,800	
	<hr/>	16,300

Utensils, &c.

Carts and instruments for cultivation to cover all, ...	Rs. 1,500	
12 pairs of buffaloes, at 30 Rs. per pair, ...	360	
10 ploughs, at 30 Rs. each, ...	300	
Pots for claying, baskets and boiling house utensils, including contingencies to cover all,	800	
		2,960

Administration

Superintendants with clerks, &c. to cover all 600 Rs. per mo 18 months, ...	10,800	
	<hr/>	42,652
Interest on this amount at the rate of 8 per cent. per annum, ...	4,618	
	<hr/>	

Total amount of outlay at the end of 18 months,
Co.'s Rs. .. 47,270

N. B. In the above no quit rent, or Government tax is stated as it is supposed it would be very light on unreclaimed lands: this amount however is more than made up by the high rates above charged to prevent a possibility of being below the mark.

Outlay at the end of 18 months brought forward, Co.'s Rs. 47,270

Return.

Of unencumbered ground adapted to the Sugar cultivation one plough will turn up per day one acre; 10 ploughs, employed will be 300 acres per month, and allowing

four months more than the usual period for maturity of the cane (14 months) 300 acres at least will be brought to perfection in 18 months.

1st Crop of maiden land generally produces 20 *piculs* of clayed sugar per acre, say 17 *piculs* of 133 *lbs.* 300 acres, 5,100 *piculs* or maunds 8,414 at Rs. 9 per md. is, 75,726

Deduct,

For manufacturing the above crop one English mill would be employed 4 months at the outside. An establishment consisting of one headman and ten assistants, the former at 40 Rs. and the latter at 20 Rs per month, 4 months is Rs. " 960

Packing and utensils required for the same, including contingencies, ... 2,500 2,460

72,266

The above amount of outlay for 18 months brought down, 47,270

Profit, at the end of two years, Co.'s Rupees, ... 24,996

The 2nd season would give a much greater profit as the only expenses to be deducted from the produce would be the incidental ones of cultivating and manufacturing; the cost of mill, &c. being cleared, and as the whole 500 acres would be brought to perfection in the ensuing 18 months we may allow an average crop of 15 *piculs* per acre and state the result as below without being far out.

500 acres, 15 *piculs* per acre, 7,500 *piculs*, or 12,200 maunds, at Rs. 9, 109,800

Less,

For cultivation as before to cover all, ... 20,800

For manufacturing, &c. 3,500 24,300

Profit of 2nd crop, Co.'s Rs. 85,500

Besides the articles of coffee, sugar and cotton, a variety of other articles would soon make their appearance if the plan I have stated for obtaining Chinese laborers were to be put in force, such as Gambier, Pepper, Indigo, &c. and the effect of an example once commenced in coffee and sugar to

the extent I have stated, would induce capitalists from the Straits and Java to embark in agricultural pursuits, provided the terms of tenure were at all encouraging; and as it is pretty generally known that the articles of coffee and sugar under every disadvantage of cultivation have generally yielded profitable returns, we might speculate upon the time being not far distant when the Tenasserim Provinces may vie with the splendid Island of Java in its tropical productions.

(Signed) EDWARD RILEY.

3.—*Remarks on the cultivation of Coffee.* By Mr. RILEY.

Various writers on this subject, when treating of the method to be observed in planting the seed, recommend that it should previously be partially dried without removing the pulpy covering, to insure it against rotting, to which condition they consider it very liable to fall, owing to the succulent nature of the berry when ripe. The best authority on the subject, (*Porter's Tropical Agriculturist*,) in alluding to this point merely states that the seed should be taken from the tree when perfectly ripe, the pulpy covering removed, and planted in nursery beds, and that the plant will generally appear above ground in a month afterwards; also that the seed ought not to be kept above a fortnight. As I have sufficient reasons, founded upon experience, for dissenting from the foregoing opinion, and as this part of the subject is of considerable importance, I shall here particularly allude to it, and state a method of packing seeds for their preservation during three months or even more after plucking. From two Coffee trees planted in a garden at this place, which bore fruit during the last dry season, I procured a quantity of seed, and to ascertain the most expeditious method of procuring plants therefrom, I made a nursery and planted a quantity from the tree, observing the method laid down in *Porter's Agriculturist*, by merely removing the outer skin; as the rains were approaching and I wished to procure some plants of sufficient strength to place within the influence of

General Method of planting the seed.

Argument against the above.

Experiment of new method of planting seed. the monsoon as an experiment; I planted another quantity having first removed both the outer and parchment skin, separated the two seeds contained therein and planted them singly. From the 15th to the 18th

Result. day after planting, the whole of the latter had shot up above the surface, and, at the expiration of three weeks, had completed the formation of the top leaf, the whole having an uniform strong healthy appearance, which continued improving until removed, two months subsequently, when they had so far advanced as to enable me to try the experiment in question. The former quantity did not make

Why superior to the old method. their appearance until nearly a month after planting, and, from the circumstance of the two seeds being incased, each of course producing its separate top leaf, one of each was invariably weaker than the other, having been deprived of the room to form its top leaf properly and in consequence required considerable time after separation to recover its natural vigour. I did not try the experiment of partially drying the seed with its natural coverings entire before planting, being convinced that by so doing the plant is considerably retarded and the germ in some measure deteriorated. By observing a proper method in constructing the nursery of a well

Nursery how constructed worked soil, of a loose nature, and planting the seed singly at a moderate depth, and using judgment as to the quantity of moisture required, all cause for doubts of its healthy condition will be obviated, provided it is plucked so from the tree.

As the seed from which I have made the experiment of a small plantation was kept nearly five months before planting, and (judging from the present state of the plants), without any injury resulting, the plan I adopted for its preservation might be considered the most effectual when it is required to remove any quantity to a considerable distance.

Seeds preserved nearly five months. After plucking the fruit intended for seed, taking care to select those in the most perfect state of maturity, they

should be exposed to the sun for a day or two for the purpose of hardening the outer covering. On becoming shrivelled and tough to the nail they should be packed in a hamper or basket lined with common gunny bags, with about one-third of their bulk of loose dry mould. In this state they can be kept for three weeks or even a month, after which it will be

Method of packing the seed to convey to any considerable distance.

necessary to repack in boxes, placing at the bottom a layer of moistened earth mixed with a small quantity of lime to the depth of three inches, upon which alternate layers of seed and damp earth may be placed until nearly full. The same depth of earth,

Length of time it will keep so packed.

&c. being placed at the top as at the bottom. In the course of three months the shoots will begin to appear and although their progress will be very slow if kept thus packed, it is advisable to transfer them to a nursery as soon after this as possible; the seed being whole when planted in this case is of no material consequence as, the coverings being old, offer but a slight resistance to the shoots which, although growing together by the top roots, have sufficient liberty to act independently above the surface, which is not the case when the seed is planted whole from the tree, the husk being then more tenacious.

Further requisites for a nursery.

I have already stated that the nursery ought to be composed of loose earth well worked, in addition to which it is requisite that it be well shaded, and so situated that the water can drain off during the rains. If only required of moderate size, one enclosed plot, with a moveable slanting cover, will answer the purpose better, as it admits of giving the young plants the benefit of the morning and evening sun at discretion. Regarding the time that the plants should be allowed to remain in the nursery, this should

Length of time the plants should be kept in the nursery.

depend entirely upon the seasons: with proper treatment, they will be sufficiently advanced to bear transplanting at the age of six months or even earlier, and should the periodical rains commence even before they have obtained this age it would be advisable to remove them into the plantation in preference to allowing

them to remain until the rains have advanced, as the excessive moisture is liable to prevent the roots from taking a sufficient hold of the soil and retard it considerably. On the other hand should the site of the plantation be exposed and wanting shade, the plants ought not to be removed until they have attained the age of

Under peculiar circumstances.

12 months, in order to provide against casualties, by which time they will have gained sufficient strength to escape uninjured the usual occurrences of the southwest monsoon. The next point to be considered is that of a site for the plantation, and although the generality of unclaimed jungles

Site for plantation.

have in a great measure a uniform appearance, still by close inspection it will be found that some sites possess a greater depth of vegetable mould with less redundancy of creepers and low jungle than others and should have the preference accordingly. In situations subject to violent gales of wind, attention must be paid to have a proportionate degree of protection afforded either by a denser shade or exclusion from the particular quarter by the intervention of high ground. Having fixed upon a site, possessing, besides the foregoing requisites, a gradual

Method of preparing the jungle for a plantation.

inclination to prevent a lodgment of the rain, the low jungle and such trees as are not required for the purpose of shade should be cut down at least three months before transplanting; and should the soil be poor with a dense jungle, a corresponding improvement will take place by allowing it to decompose, which a few showers of rain soon effects, and deposits a layer of vegetable matter which is highly beneficial to the plant in its early stage of vegetation. When the soil is good, however, and of a loose friable quality, and expedition is required, no injury will result from burning the jungle, the first showers of the season being sufficient to relieve the surface which has been hardened by its effect. Care should be observed in the

Shade to be preserved.

arrangement of the trees left standing for the purpose of shade; to prevent too great shade being preserved and not to impede the circulation of the air, both of which are of importance.

Season for transplanting.

After the first showers of the season have occurred those plants intended for transplanting should be removed at once, the ground being previously lined, allowing a distance of six feet between each plant; and great care should be taken that in transplanting, the tap root be not injured by being bent or pressed too hard down.

Proper mode of transplanting.

The best plan to be observed in this respect is, with a stake provided for the purpose, make a hole in the soil of a depth about one-third more than is required, into which the plant should be inserted to the bottom, the hole being filled up with loose soil the plant should be withdrawn to the proper depth, and the earth slightly pressed close to the roots; this ensures the tap root being perpendicular, and the next shower of rain will accomplish the rest

Consequence, if not properly transplanted.

by closing up any vacuity that remains. From want of attention to this particular many plants will be injured which will not be perceived until 18 or 20 months afterwards, when those not properly planted will lose their leaves, become stunted and probably die.

Care required afterwards.

During the progress of the plant to maturity, it will require very little care, merely that of removing any obstruction in the shape of creepers, &c. and after once weeding the low jungle will become comparatively thin and gradually disappear as the shade becomes greater by the increased foliage of the plants.

If proper attention has been paid to the nursery and transplanting, and the site be adapted, the plant will commence to flower about 18 months after transplanting; and the following

Produce of the plants at first plucking.

year commencing with the flowering, the produce may be expected to average $\frac{1}{2}$ lb. each tree at the lowest. The following season or second plucking each tree will generally average twice the quantity of the

Amount in crease.

first plucking, and will continue to increase in proportion until the sixth year. At this time they will have gained their height, and if it be found that they are too close and the branches interfere with each other it will be necessary to cut down a portion, say 20 or

30 in 1000 to allow free circulation of air, otherwise they will decrease in produce yearly. The produce of the trees cut down will be more than made up by the increased production of those remaining. In the foregoing I have stated the lowest average and annual increase in proportion to allow for casualties and be within the mark.

Instance of a plantation in Java. A plantation in Java consisting of 200,000 trees averaging about $2\frac{1}{2}$ years from the seed, produced 700 piculs of 133 lbs. the first plucking, nearly half a pound per tree; and the second was expected to amount to 2000 piculs, which is the usual rate of increase annually.

Method of curing the berry after plucking. The method of preparing the coffee in some of the private plantations in Java is the following simple plan, and judging from its appearance when exported an improvement could scarcely be suggested. The ripe fruit after plucking is divested of its outer pulpy covering by means of wooden handmills, consisting of a cylinder having lines cut horizontally close together and a quarter of an inch deep, which acts upon a bed fitted into a stand and adapted to the shape of the cylinder, having lines cut obliquely of the same depth as those upon the cylinder against which it acts. At the extremities are two moveable beds for the axles of the cylinder to work upon, allowing a sufficient space between it and the bed to pass the beam without crushing the parchment cover; at the back a sliding board is fitted to act as a feeder and prevent too great a quantity entering at once between the cylinder, to which a handle is attached at each surface and worked by two men*.

Model of hand-mill, see No 1. A machine of the above description (see its capabilities) with a cylinder four feet long by ten inches in diameter will grind 600 gantons or nearly 8,000 lbs. of ripe fruit per day. After the berry has been deprived of its outer skin by this process it is carried to the drying beds, which are made on the ground of convenient lengths, smoothed on

* This model is lodged in the museum of the Society and can be inspected by any one wishing to do so.

the surface and slanting, to prevent the water from lodging, and are covered during the rain with sliding tops made of the "allaung allaung" or tiger grass. The wet fruit being placed on these beds to the depth of about three inches, it is turned over two or three times a day, as the ground absorbs the moisture from it very quickly, and after 15 or 17 days of dry weather the husk will be sufficiently crisp and dry; and the bean having contracted considerably will admit of the covering being removed which is done by a cattle mill of the following description.

Further process of drying beds. A perpendicular shaft is fitted into a beam to secure its position, its lower end resting on a bed raised about four feet from the ground made of earth and levelled; upon this bed, a circular wooden frame of about 50 feet in circumference is fitted, having a groove of six inches by four inches deep, cut near the edge all round, in which four small hard wooden wheels, attached to a frame fitted upon the shaft, are made to revolve; a strong piece of wood is connected to the frame projecting from it in a slanting position of sufficient length to allow a buffalo being attached by which it is worked*.

Model of cattle-mill, see No. 2. A mill of the above description (see model) worked with good buffaloes will husk 800 gantons or about 10,000 lbs. of coffee per day.

Its capabilities. It may also be applied to husking paddy having wheels of different degrees of hardness and texture adapted to the process.

From the above mill the coffee is passed through a common winnowing machine which separates the broken husk from it, and after a few days' exposure to the sun on tampees or flat baskets the black beans are extracted and it is then fit for exportation.

It is usual when a crop of coffee has been plucked during rainy weather to dry it, after the outward covering has

* This model is lodged in the museum of the Society and can be inspected by any one wishing to do so.

Process of dry-
ing in rainy wea-
ther. been removed, by a slow charcoal fire enclosed in bamboo sheds, and supplied with moveable mat tops made to slide backward on beams attached to the shed, which may be quickly moved off and on as may be required to take advantage of the heat of the sun. This method, however, produces a large quantity of black beans and is far inferior to the beds of earth, which if plastered over with mortar and made smooth would be an improvement, as the lime assists in absorbing the moisture of the coffee in its wet state.

In the foregoing remarks I have confined myself to the treatment of coffee entirely from the result of my experiments in the plant up to their present age (15 months); and from their very promising appearance I have stated its further progress to maturity, which I am led to expect from personal observation of the plant in Java. Should any thing occur, however which may tend to alter my views in this respect it shall be communicated.

In my observations on the agricultural capabilities of this province I have stated by calculation the result of a plantation to contain a lac of trees, deduced from the actual outlay attending my present small experiment of 5,000 plants, considering it more apposite to be inserted under that head than in this paper, which is intended for the *practical treatment* of the coffee plant exclusively.

(Signed) EDWARD RILEY.

XXXI.—*On the superiority of Standard Mulberry trees and the culture of Silk in Bengal and the Deccan.* By SIGNOR MUTTI, Superintendent of Silk culture in the Deccan.

JOHN BELL, Esq.

Secretary to the Agricultural and Horticultural Society of India.

SIR,

I have the honor to enclose herewith a few remarks on the culture of silk in Bengal, which I shall feel obliged by your laying before the Agricultural and Horticultural Society.

I have been informed that the Society wished to have a treatise on this subject, but as such from me would only have been a repetition of what I have published in my "Guide," a copy of which has been presented to the Society, it appeared to me that the enclosed paper in conjunction with my "Guide" would probably be found useful*.

I shall at all times feel happy in giving to the Society any further information on this subject, and it will be a pleasure to me if I succeed in convincing the Society of the great advantage that would result from cultivating the mulberry as a standard tree, instead of the bush, by which means I feel certain the quality of the Bengal silk would be materially improved.

I have, &c.

Bombay, 20th Oct., 1838.

G. MUTTI.

REMARKS.

In remarking on the culture of silk in Bengal I must first state, that I have twice seen cocoons produced in Bengal, which were of a small size and soft, but which having

* Although the Committee of papers are extremely loath to reprint in their Transactions any matter that is not original, yet the close connection which exists between the following valuable communications of Signor Mutti and his "Guide to the culture of silk in the Deccan" renders it desirable that the "rule" should in this instance be departed from, in order that the fullest information on this most important branch of national industry may be brought together.—H. H. S.

been sent here as samples, I suppose were the best that could be procured.

From the manner that I have seen two Bengallees here rear the worms and wind silk, who were expressly selected and sent for the purpose of teaching the whole of the silk process inclusive of the mulberry cultivation.

From inquiries made from them.

From information derived by me, by perusing the several Bengal accounts in the newspapers and elsewhere.

From the report lately published of the proceedings of the E. I. Company on the cultivation of silk, &c.

From my careful examination of some of the best Bengal silks.

And finally from comparing the whole with my own experience in Italy and here, I perceive three principal faults in the Bengal silk culture, viz.

1st. The system of training the mulberry as a bush or shrub.

2nd. In the rearing of the silk-worm.

3rd. In the reeling of the silk.

And I would respectfully remark, that in Bengal several prejudicial opinions exist regarding the method of training the mulberry as a standard tree, viz.

1st. It is said that by feeding the worm with the leaf of the tree, the silk becomes coarse.

This is plainly contradicted by the fact that in Italy where the finest silk in the world is made, the worms are fed only with the standard leaf.

I myself here find that by following the same Italian plan I get the best cocoons and finer silk.

2nd. It is said that the leaf of the tree being hard, the worms do not eat it.

This clearly shews that as the worms are not properly reared they become weak and therefore have not strength enough to subsist upon hard leaves.

In Italy not only are the worms fed with the leaf of the tree, but we make there also a difference and distinction in

the leaves, paying more for those of an older tree and hard ones; and it is also to be borne in mind, that in this climate this insect for a part of the year ought to be more healthy and stronger than there, where only by artificial means and precautions, we are able to keep it up.

3rd. It is said that the standard mulberry does not succeed in Bengal, it having been tried but without success.

The very same thing was said here some years ago regarding the Deccan and Conkan, but experience has now proved the contrary.

It was just for the sake of removing the prejudice which existed on the subject, that I undertook to train 14 species of mulberries as standards, among which there were several of very bad descriptions and bushy, including the China divided leaf, and every one has astonishingly succeeded, fine standard trees, with large stems, branches, &c.

The only inconvenience I had, was that they gave me a great deal more to do than the other good species. They succeeded not only in the Deccan, but in Bombay and Salsette, where the climate in some places is approaching to the Bengal, but with this disadvantage, that it is not so moist and damp as in Bengal, which is a very grand thing.

4th. It is said that with the bush system, silk can be made five or six times a year, whereas with the tree only three or four—

True it is, but it is also a fact that,

1st. The result of the worms fed with the bush leaf will not produce as much as that fed with the standard leaf.

2nd. With the bush system a person is engaged all the year round in rearing worms, and winding silk and after all does not make so much silk as the other who uses the tree.

3rd. The bush occupies a great extent of land and gives fewer leaves as compared with the tree.

4th. The leaf of the bush has little substance and cannot be expected nor is it possible to produce as good cocoons as from worms fed with the leaf of the tree.

5th. The bush requires for ever expence and trouble,

which is not the case with the tree, as after a few years nothing is required for the latter except pruning and thinning, which labor is amply repaid by the wood obtained and this certainly is a very great object, saving money and labour.

6th. For the proprietor of the land having standards in his ground the place is a valuable one, it is actually a capital that he has got and the income which he yearly derives from such estate is far superior than if it is planted with bush. But what is also a very great object, is that with the leaf of the tree, if the worms are properly reared, we may always have splendid cocoons, which not only is a great advantage from the greater quantity of silk that would result, but also that we may easily have fine even and clean silk; and it is a mistake to expect to have perfect silk from bad cocoons, and notwithstanding the ability of the workman, the work is tedious and the result unsatisfactory.

Let an experiment be made of one beegah or one hundred plants of the St. Helena species following my directions given in the guide to the silk culture regarding the planting and rearing the standard, and I have no hesitation to say that the result will be, that not the bush, but the standard tree system will be found to be the one that should be followed even in Bengal. If the same extent of land now occupied with bushes were substituted with standards, a very much greater quantity of silk would be obtained, and more easily would result a better quality, beside the other advantages I have already mentioned; and in conclusion I doubt not that to the cultivators of the mulberry, who are the proprietors of the land, by thus rearing silk-worms and winding silk, will be a great deal more satisfied.

2nd. The rearing of the silk-worm.

This insect is not properly reared and consequently the cocoons produced are poor, the worm requires a longer time to spin and the consumption of leaves is greater.

One of the worst and most prejudicial things is that the worms are kept too crowded in the baskets, sometimes owing

to carelessness or bad instructions, and at others to one of those *mal entendue* speculations, to save leaves.

In fact the two Bengallees and others observed to me on my making this remark, that by keeping the worms in less baskets, there is an economy on the consumption of leaves.

I agree in that, for notwithstanding all the attention that could be paid (and indeed it cannot be expected that every one will be zealously attentive) the consumption will be always greater and there will actually be some waste of leaves. But this loss for the quantity required to make one pucka seer of silk, will amount let us say to about 20 pucka seers of leaves more. This decidedly cannot at all be compared with the greater loss that would arise from the cocoons produced not being so good as when the worms are kept not crowded, as say about 15,000 of the former would be required to give the same product of silk for which about 10,000 of the latter would be sufficient.

It is likewise certain and evident that the insects will not all spin in two and three days, a part will remain a longer time. What greater quantity of leaves would then be consumed? Consequently the assumed loss of about 20 pucka seers of leaves is only an imaginary one, and instead of a loss there is actually a saving of leaves also.

It is very easy to correct and put a stop to this very great inconvenience, by taking the trouble to shew and look after the people rearing the worms for a few days until they get the habit.

There is also another fault which is too remarkable. No difference is made in the leaves that are given to the worms especially in the last stage.

No care is taken to preserve properly the leaves for the night, that they may not get dry or ferment.

Let a certain number of worms be reared by removing them every four days, not keeping them crowded, and choosing the leaves to be given according to their age, care to be taken of preserving the leaves, and I am bold to say, that a remarkable improvement will be the result. Here several

times I made those experiments and astonished the people by showing the great difference that results if the worm is reared *comme il faut*.

3rd. Reeling of the silk.

It is a thing that very much astonished me, to observe a great quantity of Bengal silk to be so dirty and in so neglected a state.

To clear the silk of Nebs and uneven threads and *feli matti* is an easy operation. I have got besides the men, several lads that are doing it perfectly well, and they had but little practice. It only requires some practice and patience and not to be in a hurry.

It is a prejudice that generally exists in India to suppose that all the natives are good for nothing, and it is absolutely necessary that they should be constantly superintended by a European.

My experience shews the contrary. But it may be permitted me to observe that to succeed in getting a good one we should not follow the system generally adopted, which is to order a thing and to be off leaving the man to go through it, or rather to say leaving him in a mess. It requires some patience to stay with him, put him in the way and assist him, and finally from time to time, to reward him with some presents for his exertions. No such things are observed here, and as to presents it is said to be an extravagance adding, "the man has got his (or good) pay."

I ascribe to nothing more than to some patience and presents, my having been able to muster several clever and very active natives among my people.

Second Report by SIGNOR MUTTI on his efforts to extend the Silk culture in India.

PLANTATIONS OF CUTTINGS.

I would beg to call the attention of the mulberry cultivators to the experiment I have made with the trees produced from seed, the result of which is, that there is only one year

of difference in their progress to maturity between them and trees from cuttings. In my guide I stated it at about two years.

7th. It affords me also pleasure to state that in the district of Sassoor (16 miles from Poona) the cultivation of mulberries has been undertaken. This too is a place as valuable as the others, the soil being excellent, water very good, and the climate beautiful. It has further the great advantage of having a splendid pukka building in a good state of preservation and of such an extent that millions of worms can be reared. Moreover it is situated in a fine garden of 40 beegahs of very good soil, about 30 of which can be watered.

It has three wells and a stream which unless the monsoon is scarce lasts until about March. This year there is at present no water. The building and garden both belong to Government.

8th. As regards the system of planting I have studied and succeeded in inducing them to plant not in the hedges of the gardens, where there is too much shade, besides bushes and grass, or in bad soils, but in as much ground as I could obtain in the centre of the land; this I was anxious to effect not so much on account of their quicker progress in such places but to have the mulberry admitted and cultivated in the spot where the ryots have their best and favorite plants, and thus to remove altogether their well known prejudice and aversion against having in such places, mulberries instead of fruit trees.

9th. The greater part of the plantations, however are hedges together with nurseries.

10th. I proposed to every ryot in the first instance, to make hedges and nurseries; some of them refused to do the latter, saying that they did not wish to cultivate trees as they would throw into shade their annual crops of cheelies and other vegetables. This did not discourage me as I entertained hopes that by and by they would change their minds, and such has been the case with several. Plants

have been brought from Jooneer to Wargaoon and Cheencho-ree, and some also among the cultivators who had hedges, as well as others with both hedges and nurseries, at first entirely neglected the nurseries, but subsequently seeing the advantage of rearing trees, have selected the best plants from their hedges and transplanted them. This has been done by several ryots in different villages.

11th. In the Pabul, Yewla, Nuggur, &c. districts, the people have been expecting me for several months they being disposed also to cultivate the mulberry ; but my plan has been, as I formerly mentioned, to have in different places, not very distant from each other considerable plantations, and not to plant trees here and there which would not in the end attain the object in view. Next year we can begin there also without neglecting to extend them further in the present places.

MEMORANDUM, No. 1.

Of 4,59,550 Mulberry Slips planted since my last Report, dated Bombay 21st July, up to the 19th September, as follows.

Places.	No. of Individuals 1st time planted.	Quantity of Slips.	Individuals who have planted for the 2nd and 3rd time.	Quantity of Slips.
Chakun, ---	9	10,200	4	8,000
Khair, ---	2	5,325	1	3,320
Chass, ---	2	6,390		
Ousree, ---	4	3,170		
Mansheir, ---	3	3,400		
Wargaon Kassimbeck, ---	5	5,490	4	29,250
Cheenchoree, ---	1	---	1	13,420
Sankorah, ---	2	6,500		
Narangaon, ---	17	14,730	9	39,375
Hallah, ---	2	8,800	2	8,205
Bellah, ---				
Sawargaon, ---	16	36,470		
Wargaon Tambool, ---	1	4,500		
Jooneer, ---	7	5,562	1	16,200
	60	1,10,530	29	1,17,770
Sassoor, ---	13	26,950		
Hewrah, ---	1	11,950		
Deewa, ---	2	14,900		
	76	1,64,330	22	1,17,770
--- Sassoor, ---		49,850		
Government Nursery Garden, ---				
--- Bombay, ---				
Calbadavy, Nagaon, Mat- ---	24	1,25,100		
tonga, Mahim, Bohywa- ---				
rah, Sion, ---				
--- Conkan, ---				
Bassin, ---	1	2,500		
		3,41,780		1,17,770
				3,41,780
			Total, ...	4,59,550

TRANSPLANTING.

On this subject it affords me the greatest pleasure to state that the transplanting of the mulberry plants has been already begun and is continued in all directions, as will be observed by the memorandum No. 2, which follows. These operations are being carried on from the slips I furnished in the Deccan, at the end of May, June and July last, and in Bombay in February last and following months.

The former in the beginning of this month were from 3 to 5½ feet high in the stem and above two inches in circumference; seedlings 1¾ to 2½ feet high. The whole of the St. Helena species.

The plants in Bombay proceeding from slips planted in the middle of February to April, and transplanted in July are as follows.

St. Helena,	{ High.....	11	to	11½ feet.
	{ Circumference....	6	„	7 inches.
Kotroor,	{ High.....	11	to	11½ feet.
Dopia foglia	{ Circumference....	5½	„	6½ inches.
3 Species	{ High.....	10	to	11 feet.
Red	{ Circumference....	3½	„	4 inches.
Philippinah	{ High.....	11	to	— feet.
	{ Circumference....	4½	„	5 inches.

St. Helena seedlings sowing in now

Are	{ High.....	5	to	6 feet.
	{ Circumference....	2½	„	2¾ inches.

The plants in the Deccan and in Bombay are very healthy with a quantity of lateral branches, large and dark leaves, the stock quite green, the whole indicating the strength of vegetation of the plant.

I am further happy to add that the ryots have transplanted the mulberry in the very centre of their land with no other trees there to throw them into shade, &c.

N. B. The plants in Bombay would have been still higher than they now are, had not my system of cultivation retarded them, as my object is at first to form a thick stem and not to have high plants.

MEMORANDUM, No. 2.

Of 4,252 Mulberry plants, of several species, transplanted and reared as Standard Trees, by the following individuals.

DECCAN.

Places.	INDIANS	Names.	Description of People.	Plants.
Chakun,	}	1 Goppaloor Zadoo,	Jamedahr,	156
		2 Sandaram,	Patell,	27
		3 Kassee Dargah,	Koonbee,	60
		4 Chaooree,	---	5
Seroolee,	}	5 Eshwandrow Goon,	Patell,	40
		6 Hitoo,	Blacksmith	2
Khair,	}	7 Wamandrow Gunessoollee,	Brahmin,	121
		8 Gungajee Kashi Patarnah	Koonbee,	31
		9 Kutcheree Shumuldar,	Brahmin,	2
Peit,	}	10 Hoodajee Bootah,	Koonbee,	21
		11 Bowanee,	Silversmith,	9
Wargaon Kan-				
simby,		12 Ramjee Wallojee,	Shet,	158
Chinchooree,		13 Yissoo Sitwajee,	Malee,	88
Mutoongah,	}	14 Ranoo Treembaka Botah,	Patell,	26
		15 Hitoo Treembaka,	Koonbee,	21
Sarvargaon,	}	16 Harbety, Hitoo Mansoo,	Ditto,	18
		17 Jevajee Navojee,	Malee,	7
		18 Sackaram Kushee,	Koonbee,	6
		19 Tallatee,	Brn. Kool.	
Narangaon,	}		karnee,	2
		20 Bapoo Narsoo,	---	1
		21 Saydan Attar,	Mussulman,	1
		22 Madoo Morajee Kalah,	Malee,	35
		23 Gonoo Dara,	Ditto,	29
		24 Limbah Santoo Kolah,	Ditto,	28
		25 Baoo,	Silversmith,	18
Jooner,	}	26 Hoodajee Hospalee,	Malee,	22
		27 Yadoojee Sebajee,	Ditto,	12
Hoodapoor,		28 Cheemajee Staty & Arzoon	Blacksmith,	69
Hala Belah	}	29 Nawal,	Nawal,	2
		30 Balah Krustnaeh Gowin,	Brahmin,	7
Poonah,		31 Military Bazar,		60
Sassoor,		32 Govt. Nursery Garden,		281
Mahbleswur,		33 E. C. Margan, Esq.	English,	12

Places.	Cultiva- tors.	Names.	Description of People.	Cuttings.
BOMBAY.				
Mattoongah,	34	McLeod Esq.	Assist. Colr.	200
	35	Mr. F de Ramos,	Portuguese,	300
	36	Dhanjee,	Patell,	300
	37	Jamsetjee Suppla,	Parsee,	100
	38	Muncherjee Gurwalla,	Ditto,	50
	39	Mulla Kaikabad,	Ditto,	50
	40	Ardaseer Bella,	Ditto,	10
	41	Allo Braz,	Portuguese,	40
	42	Dooma Gonsal,	Ditto,	35
	Nagaon,	43	Rama Telly,	Koonbee,	40
44		Ragoba,	Purvoe,	100
45		Dewjee Jewajee,	Coppe rsmith	10
46		Mustan,	Mussulman,	80
47		Kassinath Kessow,	Purvoe,	20
48		Eduljee Byranjee,	Parsee,	25
49		Gregorio M. de Silva,	Portuguese,	25
50		Bhow Hurrichund,	Purvoe,	225
51		Nurrotundass,	Banian,	60
Mahim,		52	Mr. Jose Dias,	Portuguese,	450
	53	Ragoonath Josey,	Brahmin,	20
Sion,	54	Mannoo Mallee,	Portuguese,	35
	55	Kessoo,	Banian,	25
Bhowwarah,	56	Mr. Philipe Murzello,	Portuguese,	150
	57	Bappo Josey,	Brahmin,	125
Culbadavy,		Mr. Jose Dias,	Portuguese,	50
		Mr. F. de Ramos,	Ditto,	50
Conkan,		Mr. Salsette,		
Bassin,	58	Messrs. Brownrigg & Co.	English,	300
Total Plants,				4252

MISCELLANEOUS.

I brought mulberry leaves of the "Shah" species from Sassoor to Poonah (16 miles) in August (it did not rain while they were on their way, though it would have been better if it had), and I gave them to the worms in the following night. They were in a very good state.

Two of the St. Helena plants made a transmigration, at Kotroor Bagh, in one of 1½ years of age in the top of one branch grow broad and flat like some species of Cactus, with a very great quantity of leaves having the buds very

close one to the other : what causes this is unknown as the tree is remarkably healthy.

At Nagaon (near Bombay) the stem of the other, eight months old, has begun now to change colour and the leaves are larger, broader and thicker, and of a peculiar species. We shall hereafter see the result.

In the Deccan the cultivation of the mulberry cannot, in time, fail to be general it being a plant well adapted for, that climate, and useful even if the leaves were not used as food for worms ; and I am happy to say that several natives have already acknowledged its usefulness. In fact, in all these villages the land is open, and the ryots to guard their vegetables against being destroyed by the cattle* annually make hedges of Babul trees, which are a weak defence and last only for a few months without giving any return. The mulberry hedge if well attended to, the first year, will become as strong and effectual a defence as a wall, and the cattle cannot go in ; while the division of the principal branches beginning to grow somewhat high, the cattle cannot destroy the leaves, they thus will get the fruit and wood, and the leaves for their animals.

Several natives, having plantation of mulberries, are now inclined to believe that it will be preferable to rear worms and wind silk or sell the cocoons as well as cultivate their trees, as they would thus derive a double advantage, and many of them having women and boys in their houses doing little or nothing, they would incur little additional expense. We have persons disposed to do so (and part of them have already begun) at,

Sassor,	Sackaram Dahnee,	Brahmin† ;
Chakun,	Goppalow Zadoo,	Jemedar ;

* It is absolutely necessary that a proclamation should be issued and immediately, stating that as the people in the Deccan are now cultivating valuable plants which will hereafter be attended with very beneficial result for the country, the persons possessing cattle must take care of them, and not allow to destroy the plants, otherwise they will pay damages.

† I am informed by one of my people, that his worms have begun to spin and to make fine cocoons with which Sackaram is greatly delighted.

Khair,	Wamandrow Ganpoolee,	Brahmin ;
Wargaon,	} Ramjee Walloojee,	Shet ;
Kassimbek,		
Jooner,	Goindrah,	Brahmin ;
Indapoor,		Ditto ;

and I doubt not that in due time others will come forward. Employment offering the means of earning money is very scarce in the Deccan, and the whole process of making silk is well adapted to the genius of the natives.

Many have remarked the peculiar advantage of the mulberry, which (like their fruit trees) does not require any person to watch it to prevent its being plundered or the produce being destroyed either by birds or by dew, so that they can always rely on obtaining a return for their labour.

I am happy to say that having sent some of my silk to London, Glasgow, and Manchester, the most satisfactory reports of it have been received from these places, where it has been valued as high as 23*s.*, 26*s.*, 29*s.*, and here I must add that the silk so reported on was made by natives without either assistance or superintendence from me, or my head-man.

There are already upwards of 20 natives acquainted with the winding of silk, and the people of their own accord are ready to adopt the system generally, dividing the silk culture into three classes (as other countries), viz.

1st. Person cultivating only the mulberry and selling the leaves.

2nd. Ditto rearing worms and selling cocoons. These can be carried a great distance and the expence would be a mere trifle.

3rd. Ditto winding silk : and all this has been attained without either a settled establishment or regular plantations.

Among the particular operations performed since my last report, I have sent by Tapall cocoons for seed or silk worm eggs*.

* In this way eggs can be sent to a greater distance than if eggs themselves were forwarded by the mail. For instance worms from eggs are produced on

To Dr. Gordon, at Umballa.

To Mr. A. N. Groves, }
 To Mr. F. D. Bynes, } At Chittoor near Madras*

and mulberry seed to the two last mentioned gentlemen.

To Mr. F. de Ramos, in Bombay†, mulberry seed and silk worms' eggs.

Two of my people to rear the worms, plant mulberries.

One ditto to wind silk and teach persons to do so.

One ditto to prune his mulberries.

I came myself also to superintend the operation.

I have also sent to Sassoor to Sackaram Dahnee, Brahmin, silk worms' eggs‡, and one of my men to teach him for a few days how to rear the worms.

To Indapoor, to two brahmins§, silk worms' eggs.

One of my men to rear worms.

One ditto to prune.

One Assistant to inspect.

Poonah, { Mulberry trees pruned.
 { In the Military bazar, and the city.

Bombay, in the Agricultural and Horticultural Experimental Garden||.

the 9th day. By sending the cocoons on the afternoon of the 3rd day from the places where they are spun, as the moths do not come out until the 9th day when they lay their eggs, thus we gain six days: attention should however be paid that the baskets containing the cocoons are lightly filled.

* These gentlemen seem to have a laudable desire of inducing the natives there to follow the silk culture.

† Is trying an experiment by making a few pounds of silk to see how the worms and the silk will answer. He fed the worms, partly by pruning his mulberries, and partly from old standard trees existing here and there in Bombay. This establishment I hope in a short time will be of magnitude.

‡ There are at Sassoor 14 standards of the "Shah," (many leaves are not to be got from them except from 2,) many people were very curious to see the worms, &c. and Sackaram also was anxious to show that he is able to have a silk manufactory, being very willing to get the Government nursery Garden, he is therefore rearing upwards of ten thousand worms in his own house.

§ There are 1000 St. Helena standards of about three years of age. The proprietors (and others) being extremely anxious to make an experiment of a few thousand worms to be fed by pruning the said plants.

|| About the end of February I pruned a young standard mulberry of the

I have presented, at my own expense, one machine to wind silk, and one copper boiler to each of the undermentioned natives, viz :

Wamandrow Gampoolee,	brahmin,	Kheir.
Sackaram Dahiree,	ditto,	Sassoor.
The Brahmins,		Indapoor.

Kootroor Bagh has been open to any one desirous of learning all the silk process, and I have had 14 persons from Wargaoon Kassimbeg, Narangaon, Khair and Poonah and have fed them at my own expense ; they have cost each rupees 2, 2½ and 3 per month. They have pruned (or rather ruined) trees ; reared (or rather ill treated) worms ; wasted leaves ; baked (or rather burnt) cocoons, and finally wound (or rather destroyed) a quantity of cocoons, but they have more or less learnt the whole process. Several of these people have mulberry plantations.

The whole of my best people, not excepting my head-man, have been employed as my assistants, malees and peons, and Kotroor Bagh entirely neglected.

I have rented since July a house at Wargaoon, and paid five rupees a month.

I had two riding tatoos, but not having sufficient strength to be all the day on horseback, and moreover in the monsoon being compelled at every moment to cross deep and dangerous rivers, thus getting myself frequently wet which is always prejudicial to health (especially to me), I was therefore compelled to have a palankin with 12 bearers also ; so that my batta of rupees four a day was not sufficient (calculating the other expenses of carrying my things, &c.) to meet the charge, and I have been obliged to defray part of my travelling expenses from my pay of rupees 250 per month.

Government allows me rupees 150 per month for my establishment and mulberry nurseries.

white species ; and in July following I found it had increased in the number of its branches, and one of them was 11½ feet high and with a circumference of inches 4 and 2.

In five months instead of	Rs. 750 0 0
I have only spent	290 7 4

And thereby have saved 459 8 8
for Government.

In visiting the places where mulberries are cultivated, it is my practice when I find that proper care has been taken to make a present of $\frac{1}{4}$, $\frac{1}{2}$ or 1 rupee of my own, and not on Government account; I have kept no account, but I have certainly not spent in this way all this time more than about rupees 90. To obtain the object in view an expenditure of rupees 400 or rupees 500, in these presents would be of little consequence to Government, and that expense would be only for the first year during which if the mulberry is carefully attended it will become well advanced.

We must also bear in mind that in the introduction of any new system, and particularly in countries where the prejudices of the people are so great as in India, and where there is no spirit of enterprize. Something must be done to please them and dispose them to take an interest in their undertaking, and I think indeed that cannot be done for less than that, considering the number of the cultivators.

I have not limited myself simply to planting mulberries, but obtained from Government also permission to lend some natives small sums as *Tuggavee*, to clear wells and purchase bullocks on the condition that the proprietors of the land shall cultivate mulberries; and I am maturing a plan which I hope will also do some good if Government are empowered and determined to adopt proper measures for improving the Deccan.

I must further repeat what I several years ago stated to be my humble opinion, that it does not require, as many are inclined to believe, lacks of rupees to make improvements; for I am decidedly of opinion that with half a lack much might be effected and in a short time; I attach less consequence to the money, than to a well combined plan, in which

the parties concerned in its execution take a zealous and active part, looking only to the end in view and avoiding unnecessary delays which are generally followed by loss or failure.

In the miscellaneous branch I said, that there are already several natives disposed to rear worms. But I have had another plan in contemplation for several years, which cost me not a little money, pains and patience. I have kept at Kotoor an establishment of several persons, whom I have instructed in all the branches of silk-making to the best of my ability, and have succeeded in rendering them smart, intelligent, and active. The services of these people can always be made available, and my plan is to have them divided and placed in those situations where there are considerable plantations. For the present each will look after and superintend the plantations existing in his district, and when the time shall arrive for commencing to wind silk, Government might be solicited to advance them a few hundred rupees on loan as Tuggavee, to make a small building for rearing worms and for frames, baskets, &c. To keep this establishment up as at present, the allowance of rupees 150 which I receive is sufficient.

The buildings required will be three or four, so that the expense to Government will be a mere trifle, as compared with the advantages to be expected.

The undertaking must be, on account of these natives and the product from the silk, their own.

Government will have no occasion to keep up the silk culture establishment longer than two or three years at the utmost.

I beg to recapitulate that in three months and twenty-seven days notwithstanding I have not allowed the people to have the ground in which they planted the mulberries rent-free, (although it had been offered by a proclamation from Government,) mulberry trees have been planted as follows, viz. :

33 Villages in the Deccan.

6 Ditto in Bombay.

1 Ditto in Conkan.

40 Total, and

213* Individuals have been induced to plant them in the Deccan, and

24 In Bombay.

1 In Conkan.

238 Total.

Of this in the Deccan

110 take the greatest possible care of their plantation,

54 tolerably so, and

49 very little or no care whatever.

I beg also to annex the following abstract of slips planted, and description of people who have undertaken to plant them.

Deccan by the ryots, slips	4,39,481
--------------------------------------	----------

Ditto, besides in the Government nursery Garden at Sassoor,	49,850
---	--------

Bombay,	1,25,100
-------------------	----------

Conkan,	2,500
-------------------	-------

Total slips,	6,16,931
------------------------	----------

Deccan, planted—by

1 Nawab.

2 Shetts.

24 Patells.

8 Koolkarnees.

30 Brahmins.

4 Goldsmiths.

3 Black smiths.

1 Taylor.

72 Malcees.

* In one of the villages in the Deccan, Narungaum, 59 individuals have been planting mulberry trees.

50	Koonbees.
8	Mussulmans.
2	Gossay.
1	Fakir.
2	Desmooks.
2	Goroos of the Temple.
1	Maar.
1	Arab.
1	Jemedar.

Total, 213 in the Deccan, and all these things have been effected without annoyance to any of the parties concerned.

G. MUTTI,

Bombay, 31st October, 1838.

Supt. Silk Cult.

A Guide to Silk Culture in the Deccan.

GENERAL REMARKS.

To any one at all acquainted with the great advantages derived from the cultivation of Standard Mulberry Trees, for rearing the Silk Worm, it must long have been matter of surprise and regret, that the inhabitants of a country, such as this, so favored by its climate, and in every respect so well adapted for the production of Silk, should have, up to the present time, so little attended to its culture.

Considering also the large consumption of Silk on this side of India, it becomes still more a matter of astonishment, that attempts should not long since have been made, to supply it by Home production, and thus also retain, to enrich its own population, much of that wealth which is at present expended on the Raw Silk of a foreign country.

That there is an extensive field for the employment of capital in this country must be universally admitted, and I know of none so likely to yield a profitable return to the capitalist, or to prove so beneficial to the country itself, as the cultivation of Silk.

Moreover, there is no occupation, I can imagine, so likely to interest, and so well suited to the Natives themselves, as the Silk culture, involving as it does, so little comparative labor and fatigue.

The Mulberry requires only careful attention (the degree of which gradually decreases every year) for the space of about five years, when the expense attending its cultivation ceases, and no other labor is required than that of pruning and thinning, which is amply repaid by the wood obtained. I do not doubt, therefore, that the Natives would be easily induced to devote their attention entirely to the cultivation of the Mulberry Tree in preference to the Fruit Trees they at present cultivate, with so little profit to themselves, or advantage to the country.

In most other countries where Silk is cultivated, the climate will only allow of the leaves of the Mulberry Tree being gathered once a year. Here the climate is so favorable, as to permit this being done three times in the year, without injury to the Tree.

In short, the advantages attending the Silk culture must be obvious to all who consider the subject, and I observe, with pleasure, that they are now being generally admitted.

With the view therefore, of promoting, to the best of my ability, the success of the efforts now making to introduce the cultivation of Silk extensively in the Deccan, I have endeavoured, in the following pages, to give a practical detail of the process, with the expences attending it, and an estimate of the probable returns. And if my labors should in any way, conduce to increase the resources of the Deccan, or assist the views of the Right Honorable Sir Robert Grant, in his benevolent exertions for the improvement and prosperity of the Territories under his rule, I shall consider myself amply rewarded.

The necessary preparation of the Land for the Cultivation of the Standard Mulberry Tree.

If the ground be not level, it should be made so, to prevent an unequal distribution of water during the monsoon.

All trees or shrubs on the ground, should be cut down, or else planting within their shades must be avoided, as they not only impede the growth of the Mulberry tree, but also greatly diminish the quantity of the leaves, and materially injure their quality.

In order to check the growth of grass, which abstracts no small portion of the nourishment intended for the plant, the land should be well ploughed and harrowed twice before planting. The month of April is the best time to do this.

The holes for receiving the trees should be made some time previously to their being planted, for there is a very great advantage in having the ground well softened. These holes should not be less than two and a half feet square. The depth need not exceed 2 to 2½ feet, but less will do if the soil be not deep, as the root of the Mulberry grows horizontally and not downwards.

The advantages resulting from having the holes made sufficiently broad, are indeed very considerable, for the tender roots when not meeting with the resistance of a close, hard earth, quickly extend and multiply, and thus a fine healthy tree is speedily produced, whereas when the earth around is hard, vegetation is greatly retarded, for the roots, by the resistance opposed to their extension, become cramped and weakened, for want of sufficient earth to nourish them.

When a plant is observed to remain weak, and its growth appears injured, it is advisable to root it up, and substitute another, as great success cannot be expected in such cases; but if the plant has not been a long time in the ground, cutting down near the roots may be tried, taking care, however, to dig and water the ground a few days previous to this operation.

Manuring.

The manure is an object of great importance, and should be taken into immediate consideration in the Deccan, as that which is usually obtained in the villages and city, is not good. It is therefore advisable to prepare the manure on the premises, in the following manner.

Dig a hole in the ground, and fill it with leaves, bones, the cuttings of leather, old chunam, and animal dung, and fill this hole with water two or three times, unless it is made during the monsoon, which is the best season for favoring decomposition. The mass should be occasionally stirred with a stick.

The leaves and litter taken from the Worms is an excellent manure.

Hedges.

Should the land be without good hedges, they must be made, otherwise the cattle will destroy the young plants, as it is the custom of this country to suffer them to wander at large without any person in charge of them. In the hot season especially there is always a great number of these wandering cattle, which travel many miles from the city and villages, and commit devastation during the night.

THE STANDARD MULBERRY TREE.

This very valuable plant, if well cultivated, thrives amazingly in the Deccan, as may be seen by the several plantations I have made at Poona, and from my statement in the Appendix.

It requires indeed, that care be bestowed upon it, principally in the proper preparation of nurseries, and close attention to it at the very commencement of its growth.

For our object is not only to produce a large tree, but to make it a rich one, and by rearing it on the best system to obtain a supply of substantial leaves.

There are several species of the Mulberry tree, the leaves of which are more or less adapted for feeding the Silk Worm.

Some of these kinds are incapable of attaining the size and height of a large tree, others become too bushy, &c.

I shall notice some of those to which the preference is due.

The *St. Helena* species bears a fine united leaf, and in great quantity, of which the Worms are very fond. It is of much quicker growth than any other species, and agrees with every soil, though the black seems to be the one best adapted for it. It requires less water and digging than any other; but a peculiar management is required for its cultivation; for if improperly reared, the plant becomes bushy, throwing out numerous twigs and small leaves, and also bearing abundantly of fruit, which is small, black, and very sweet. The plant is naturally bushy, and requires (besides being pruned regularly like the other species) an additional pruning once or twice a year, but only to the extent of a few branches and twigs, and that after the third year of the plantation.

The white Mulberry has a rather thick, but an excellent light and glossy green leaf, which can be kept for two days without becoming dry or shrivelled. This species agrees best with either a red or whitish soil. It requires more irrigation and digging of the soil than the *St. Helena*, but still does not attain quick growth. It bears a white small fruit.

The Red has a large thick and glossy leaf, and a black long fruit resembling a cock's comb. It grows tolerably well in any soil, but requires much water and digging. It does not require so much pruning and thinning as the others. Its leaf is very good for the Worms, but is not so fine as the others, and contains more moisture.

The *Kotroor Dopia Folia*.—This species is a transmigration from the *St. Helena**. I have two Trees of this interesting species in my establishment here. One of which changed the first year after planting, and the other in the second year. It bears a long fruit, and has a very good leaf resembling the

* I have remarked another instance of a similar change in a tree of the China divided leaf, which after 5 years instead of its usual small black fruit, produced a long white one. The leaves are always the same.

red, but about half its size, and is still more glossy and thick, with a finer leaf. It grows tolerably well.

The common country "Shah" Toot has a long white fruit. With plenty of water and digging, it grows tolerably. This species becomes a very large tree in any soil, and supplies a very great quantity of leaves. It is the only species that although unpruned and unattended to, grows large and continues to furnish leaves in abundance, but of course requires a longer time. Its leaves are larger than those of any other species, and resemble the Fig leaf. They may be given for food the second day after being gathered, but the Worms must be very well reared and healthy to be able to eat them, as they are very coarse and hard. This is the principal objection to them. When the tree is old, the leaves become much smaller and better.

Dapoorce Dupia Folia.—This thrives better in a red and whitish soil, but grows very slowly. I cannot recommend its cultivation, as it is in many respects inconvenient and unprofitable.

There are several other kinds possessing large leaves, but most of them are ill adapted for the Worms. Some never become large trees; the leaf of others is found to contain a great quantity of moisture; some as soon as they ripen become immediately dry and black; while others again become so as soon as they are gathered.

I possess 14 species of Mulberries.

The Mulberry becomes a very large tree and lasts for a great many years. It may be propagated by seed, by slips and also from layers. The first is the best mode, for then the tree lasts a longer time, becomes larger, and yields more leaves. The length of time (about two years) indeed, which it takes to come to maturity when planted from seed, has been objected to. But in this, as in all similar cases, we should look to the great returns that will ultimately be obtained as a compensation for the delay.

One great object I have in view is to induce the Natives to look to the future, to create in them an interest in the land,

and to show of how much more value ground may become to them by being made a lasting and valuable plantation, descending to their families, than by being merely employed in a succession of crops of comparatively trifling value.

The Mulberry Standard Tree does not require so much water as is generally supposed, but may be successfully planted in land where there are no wells, and which are merely watered by a puckhal. In this case, the plantation should be made a little before the commencement of the monsoon.

The growth of the tree will not be so rapid from this mode of watering, but the difference will not be very great. I may adduce an instance in the trees that have been planted in the bazar and city of Poonah, and in the lines of the Bombay European regiment.

With regard to the period of watering, the following directions must be attended to.

For the first two months after a Mulberry has been transplanted (in a black soil) it will be quite sufficient to water it once in 8 or 10 days. For the other months of its first year, once in 10 or 12 days, afterwards 12 to 14, and so on.

A little practice soon teaches us by the appearance of the leaves when the plant requires irrigation.

The nature of the soil will make some difference.

Watering by the puckhal, should not be sparingly performed, as is usually done, but copiously at every time.

It must here be remarked, that the growth of the tree does not depend entirely on the quantity of water and manure which may be given to it, but also on the care which may be taken in digging the soil and keeping the earth around the plant loose and in good order.

Should the monsoon, even, (as is sometimes the case in the Deccan) disappoint our hopes, the progress of a well cultivated Mulberry tree, will not be retarded by this circumstance, nor the supply of leaves be materially diminished.

The Mulberry bears fruit twice a year, in March and November. That of the St. Helena tree I have sold in the bazar at 5 and 6 pice the seer. For that of the red 8 pice can be obtained.

The fruit of the tree may always be turned to some advantage. Good vinegar can be made from it, and sold at a profit; or during the hot weather very refreshing syrups and sherbets may be procured from it.

When the leaves are ripe, the best plan would be to gather them with scissors. To gather them by the hand requires extreme care, so as to avoid injuring the buds and bark. With the scissors the operation can be always safely performed, and a little practice soon renders the method easy.

In gathering, three or four leaves should always be left on the top of each branch.

Plants are subject to much injury during the digging of the soil, if this is carelessly done: particular attention, therefore, ought to be paid at these times not to wound or otherwise injure the plant.

I come now to the very interesting subject of pruning.

The treatment of the tree in its progress to maturity is not always the same, but depends much on the growth and condition of each individual plant. If a plant be prosperous from the commencement, it will not give much trouble in pruning. Some of the lowest branches in such cases only require to be cut. Vegetation in general proceeds upwards, but it sometimes happens that the strength of the tree is diverted to one or two of the lower branches, the upper remaining poor. In those instances, cut the former off close to the bud. Generally speaking, the upper leading branches should not be touched until the tree is one year old, when we begin to form the lateral branches. The first branches are formed by checking the growth in the leading ones, after cutting which the sap is diverted to the lateral branches, giving the tree a round lofty appearance. The side branches however would also grow long and straggling, and are also cut at 18 to 20 inches from the stem, leaving the eyes or buds outside, so that the middle of the tree may remain clear.

The interior of the tree should be cleared of all branches so that the sun and air may freely penetrate. In about 8 months time, it will be proper to cut the new shoots, and form the

second branches. These should be left longer than the first; about two and a half feet will be the proper length. After about 8 months, the new shoots are again cut still longer, say about 3 feet, and so are formed the *third* branches. In this manner we proceed, taking care that in cutting the buds are all left outside, and the interior of the tree all cleared. A tree treated in this way soon acquires a strong healthy appearance and produces a quantity of leaves.

From this method of pruning also an additional and great advantage arises; steps are formed in the tree itself, and the labourers are enabled to climb into it, for the purpose of picking the leaves, without the necessity of using a ladder.

When a plant is observed to make no rapid progress, and the stem, though long, is deficient in size, it will be necessary to cut the stem itself. This should be done at that height from which it is intended the branches should proceed, and we may thus expect new and strong shoots.

There is no fixed height which the stem should be required to reach, before the division of the principal branches; but the most convenient height for their division will be at the distance of four feet from the ground.

The principal object in the treatment of the tree, and which must always be kept in view, is to form a large stem or trunk. We must bear in mind, that the vegetation of the Mulberry in this climate, is very rapid, and the nature of the tree inclines it to attain a great height in proportion to its thickness; consequently, we must rather endeavour to retard its progress in height, than to allow it to proceed with the usual rapidity. In such a rapid progress the stem acquires little strength, and we are subjected, in order to remedy this, to frequent cuttings of the branches, which entails labor and loss of time.

It is necessary even, to be very cautious, in cutting the Mulberry, especially when it is a young plant, as it is liable to be impoverished. Pruning and thinning, are no doubt, essentially necessary operations for improving the leaves, and increasing their quantity, but if these are unskilfully performed, a contrary effect is produced.

Period of Gathering the Leaves.

If the tree be of the St. Helena species, this may be done after, but not *before* the fifth year. We may indeed, when the tree is only four years old, begin to rear the Worms on the leaves procured by pruning ; but those obtained in the preceding three years being so small in quantity should be sold, unless the plantation is so extensive as to afford them in sufficient quantity to render it worth while to commence rearing. The other species of Mulberry require a delay of about two years more, and even then I do not think the same quantity of leaves can be expected as from the St. Helena tree.

No consideration should induce us to attempt the making of silk before the tree has attained a proper age. We only thus incur much inconvenience and loss. Of the truth of this I have had myself unfortunate experience, but my case, (an extraordinary one,) required it. Every plant requires its own time to come to maturity, and I cannot possibly understand why the Mulberry should be considered an exception to the rule. On this subject all reasoning about climate is useless. The climate has its limits, and nature every where maintains her own principles, an ignorance, or abuse of which is invariably attended with evil consequences. The cultivation of silk, like all husbandry, requires steadiness and perseverance in *one* object.

In concluding, therefore, this branch of my subject, I shall only add, that in the cultivation of the Mulberry tree, it is clearly our interest to devote our whole attention, in the first instance, to the growth of the tree, and until it be fully grown little more should be attempted.

NURSERY BY SLIPS.

The ground is to be properly prepared, manured, and watered.

Select the cuttings from a good and thriving tree and while vegetating. Let the slips be neither too large nor too

thin. The length of each cutting should be 7 inches. They should be cut at the top and the bottom horizontally, and not obliquely. Cut close to a bud and remove all the buds, with the exception of one above.

If the cuttings are not planted during the monsoon, they must be put in water for one night previous to being planted.

The slip is to be stuck into the ground two-thirds of its length, in a perpendicular, and not an oblique direction. The cuttings must be planted separately, and not two or three together. Their distance from each other must not be less than $1\frac{1}{2}$ feet. They are arranged in a straight line, leaving between the lines another $1\frac{1}{2}$ feet of space for the convenience of weeding. Care must be taken to keep them clear of grass.

If the slips are put down in the hot weather, (which cannot be recommended,) it will be necessary to cover them during the day with a grass chuppar, but at this period their growth will always be slow, even with frequent watering.

At other seasons, provided the above directions are well attended to, a prosperous and quick growth of the plants may confidently be expected.

Of the St. Helena species of Mulberry (except when planted in the hot weather) every one of the cuttings will spread and come forward. Of the other kinds, but few cuttings are generally found to succeed, and they require more frequent irrigation. For the propagation of these, therefore, recourse must be had to seed or grafting, or layers. In bending down to the ground branches for the purpose of layers, care must be taken that they be not broken, and the bark all round is to be removed.

NURSERY BY SEED.

As soon as the fruit is ripe, it is to be collected and placed in water mixed with sand. In this it must be well rubbed by the hands in order to separate the seeds. The ripe and good seeds will soon fall to the bottom of the water. The seeds must be treated thus two or three times till they

are freely divided. They are then exposed to dry and preserved in a bottle, if not wanted for immediate use, but the sooner they are used the better.

If the seeds are sown in the hot weather, they should be covered during the day, so as to protect them from the sun, or they may be sown in a shady place in baskets. The night before sowing they should be soaked in water.

The ground having been well ploughed and harrowed, and the earth perfectly pulverized, manure is to be laid on, and the seeds being sown, the earth is to be slightly turned over them. Water should now be poured over the ground from a tin watering pot, or earthen vessel, but this must be done gently, otherwise the earth is liable to be washed away, and the seeds disarranged. In 8 or 10 days the plants generally appear.

In about three months a *second* nursery should be formed, and the first plants transplanted at a distance of 16 inches from each other. After 3 or 4 months, a third nursery should be made, and another transplanting at a distance of 24 inches effected.

The Mulberry from seed, differs in the organization of the root, from that produced by cuttings. The first has only one long root, which requires to be cut off; very little of it being left the second time after it is transplanted, so that hereafter regular roots may spread around it.

TRANSPLANTING.

There are two methods of transplanting, one when the plant is taken up with the earth around it; the other when it is removed with its roots bare. The last is the plan followed in Europe, where the young Mulberry is removed in this way, when about three years old, from the "vivajo" or second nursery, to the fields.

I tried this method at the commencement of my proceedings in this country, but without success, owing to the bad management of the natives. For though I contrived a small

implement for burying the roots without injury, yet these were always found to be cut, and materially injured. I have since therefore generally adhered to the mode of removing with a quantity of earth. This I do when the plant is from three to four months old, and I have found it answers perfectly well.

The other system however is deserving of careful trial, as it is one well adapted for this country. It is in the first instance, more economical, because the plants could be left for two years planted close in a second nursery, and as less ground would thus be occupied, the irrigation would not be so expensive, the proprietor also could for these two years, use for other purposes, the land destined to receive the trees.

Hereafter too I trust when the Natives begin to devote themselves to the cultivation of the Mulberry, they will soon acquire sufficient practice for performing the operation of removal, without injury to the roots.

My own experiments, I must add, were in the first instance unfortunate, principally on account of my being very hurried, and having to transplant a great number of trees at once, and to employ people who were quite unacquainted with the process. I have again in this year tried with a small quantity of trees, and have succeeded well. The trees so transplanted are thriving exceedingly well

The operation of transplanting would be better effected in the afternoon, so that the young plants would not be injured by the strong heat of the sun. If it is done in the monsoon, care must be taken that the holes made for receiving the young trees, do not contain water, and are not too damp. If this is the case, the plant suffers; as the earth with which the holes are filled up, instead of being loose and soft, becomes hard and impenetrable.

The manure should be examined before it is applied to the young Mulberry after transplanting, and it should be properly matured.

Transplanting is an operation requiring all the attention that can possibly be given to it, as on its being properly

performed, the prosperous growth of the tree very much depends.

The best seasons for transplanting are the beginning of September and May.

Transplanting with Earth.

In transplanting, the Mulberry proceeding from slips should not be removed till it is three or four months old. It should be taken from the ground with soil not less than 12 inches in depth. While placing it carefully in the hole prepared for it, the earth must be so far removed as to discover the roots. Of these all at the bottom are to be left, and their extremities only cut horizontally, and not obliquely: all the others above are to be taken away, being cut close to the stem.

After three months the ground will have to be dug, and a similar cutting again performed upon such roots as shall be found to have spread.

By cutting the roots in this way, several advantages are obtained. The tree becomes stronger, and has a finer and more regular appearance. The roots being all below are not liable to be injured by the plough, or by the heat of the sun, during the hot season.

The holes made for receiving the young plants, must be filled up with earth taken from the surface of the ground, and not with that taken from the holes themselves.

In irrigating, after transplanting, care must be taken, that the earth around the plant is not pressed with the feet. It should, on the contrary, be left loose, and there is no disadvantage in a considerable absorption of water.

The young trees should be planted at the distance of not less than 20 feet from each other. An opportunity is thus afforded of sowing grain, or planting vegetables in the intervals between the trees, but this should never be done till the trees themselves have reached the age of three years.

Transplanting without Earth.

In this operation, the holes made for the reception of the trees, should have additional channels leading from the

main body of the roots to receive the long arms, as it is very important to place them properly so as to avoid cramping. —The extremities of the roots are to be cut as before described, and only one circle of them left below.

1. As some hours are required for transplanting one tree, care should be taken to protect in some way these roots which lie already exposed to the heat of the sun, either by covering with earth or cloth.

2. If any root has been injured, it should be removed, or it becomes rotten. The roots should be carefully divided and put straight according to the direction of each, and in filling in the earth, care must be taken not to disarrange them.

3. Except in the hot season, the trees dug up with the roots, can be conveyed 5 and 6 days' journey, but they require to be packed up properly with grass, and refreshed on the way with sprinklings of water.

HEDGES OF MULBERRIES.

If these are properly cultivated, a great quantity of leaves for the young Worms may be obtained from them. From one hedge of the St. Helena species, 306 feet long, and only a year planted, I obtained at one gathering, one hundred and fifty Pucca Seers of leaves, and next year I expect a deal more from it.

For the purpose of making hedges, a trench should be dug two feet broad, and as many deep. In this, manure and water should be first put, and then the slips are to be planted in it, at one foot distance from each other. When these arrive at about twelve feet high, they are to be cut at two feet distance from the ground. After six months they must be cut again at the same height.

Leaves from these hedges are to be gathered in the same way as those from the tree, and they should be pruned twice a year, in March and August.

THE REARING OF SILK WORMS.

This wonderful insect, thrives remarkably well in the Deccan. The eggs from which it proceeds, are here hatched all the year round by the heat of the climate alone, without (as in other countries), the necessity of artificial means. The regular time required for hatching is 9 days, except in the cold and hot weather, when it generally takes 12 or 15 days.

The only proper food of the silk worm is the leaf of the mulberry.

From the middle of June to about the middle of October, the worms may be kept in rooms with all the windows and doors open, and during that period they thrive capitally.

From the middle of October until the beginning of November, the weather is generally too hot for them, and from 11 to 4 o'clock in the afternoon, the place in which they are then kept should be closed, and in some mornings at the end of the same month likewise, when it is cold. In the greater part of November the weather generally agrees with them; but from about the end of November or commencement of December, to about the middle of February, the prevailing cold affects them. At this time therefore it will be necessary to light fires from 10 o'clock at night till 9 next morning, when the rooms may be opened. At this period, as well as in a part of October and November, the progress of the worms is but slow; they take a longer time to spin, and they do not form very good cocoons. It might be easy to obviate this, by keeping up large and regular fires, which I have never here tried, as is done in Europe; but as we have abundant time during the other seasons of the year, it is not necessary to rear worms in the hot and cold season, nor would it be proper to gather the leaves frequently in the hot, and worse still during the cold weather, as it might be fatal to the tree.

From the middle of February to the end of March, the worms can be reared with tolerable success. From April to

about the middle of June, unless great precautions are taken, the great heat kills the worms. They are all of them most liable to perish during the period of hatching. If they survive over that, we may hope to save most of them. The greatest care is necessary, especially at the first and last stage of their growth.

The following is the method I have generally followed in managing them during the hot season.

I keep the baskets containing the worms in the lowest divisions of the frames. I place beneath, earthen pots filled with water, and once a day, at 12 o'clock, I also throw water all round the frames. During the heat of the day, I keep all the windows and doors shut, and open the whole of them as soon as the heat declines. By these means I am able to keep the temperature at from 85 to 92 degrees. This very extraordinary year (1837) on account of the heat, cold and rain, I have been unable to equalize the temperature so much. For some days the thermometer in the rooms rose to 98, and this was attended with a loss of about 15 per cent. of the worms. The survivors made but small cocoons.

I should think, that the system followed in Bengal, of keeping the worms in double baskets, in the hot season, the outside basket being always kept wet with water, would answer better than mine, and I regret not having made the experiment. The temperature most suitable for the worms is that of 75 degrees of Fahrenheit, but less, or an addition of a few degrees, makes very little alteration in their health, and this is generally the temperature in the monsoon.

When the worms are young, they should be kept warmer than when they grow older.

Persons intending to rear worms, should commence by calculating the quantity of leaves they can obtain, in order to ascertain the number of eggs that may be required. They must bear in mind that it is far better to be deficient in worms than in their supply of leaves, for it is not only the quantity of these, but likewise their quality that must be attended to. If the insects are not provided regularly with

the necessary quantity of proper food, the cocoons produced by them will be very poor; consequently, double the quantity of them would be required to furnish the usual proportion of silk. Moreover, a greater number of people are required to attend the worms; and finally, we may be compelled, for want of leaves, to destroy many, or even the whole, of the insects.

Method of Rearing the Worms.

The paper or cloth containing the eggs, is put into baskets, and these are placed in a frame-work fitted up in the room designed for the rearing, (vide Appendix.)

As soon as the eggs are hatched, tender leaves are placed over the young worms, upon which they are immediately seen to climb. Particular attention is requisite in doing this. The leaves should not be applied until it is perceived that all the eggs are hatched, (or the greater part of them,) as they generally are on the same day.

The worms are next removed with the leaves into a second small basket, which is to be lined with paper.

Too many worms must not be suffered to climb upon the leaves, and very great care should be taken to remove them in time, as this is a most important object to prevent their being crowded.

The worms removed in the afternoon are not to be mixed with those of the morning, for though there be only an interval of a few hours, much difference is observed in the growth of different sets.

The meals for the worms are to be regulated as follows:

<i>For the hot season.</i>	<i>To be fed</i>
1st stage.....	6 times in 24 hours.
Remaining stages.....	5 ditto... ditto.
<i>During other seasons.</i>	<i>To be fed</i>
1st stage	6 times in 24 hours.
2nd do.....	5 ditto... ditto.
3rd and 4th do.....	4 ditto... ditto.

To be fed day and night, every four, five, and six hours, regularly.

In the first stage, tender leaves finely chopped, should be selected; as the worms advance, the chopping may be dispensed with, and the leaves cut with a knife; and at the last stage, they may be given entire.

If any of the worms are observed to have a greater appetite than others, their supply of food should be proportionally increased.

The worms are liable to sickness or change of skin. Some are sick three, and others four times during their life, and remain so for about one and a half to three days. At this period they should not be fed. The commencement of their sickness is easily known by the following symptoms. They turn yellow, many of them remain under the leaves, others continue motionless, with their heads elevated, and some crawl from the centre of the basket to its edges. When they are recovering, it is observable by their becoming whitish and in motion.

As the worms never eat all the leaves provided for them, a portion of these remain with their litter, and as it would be injurious to the worm to allow it to continue in an uncleanly state, it becomes necessary to remove the insects every four days into clean baskets. This is always done by putting leaves upon them.

It is a matter of the greatest consequence to give the worms extensive room for their growth. As they increase in size, therefore, the number in each basket must be reduced. The contents of two baskets must after a time be distributed into three, then four, and so on, especially after the 4th stage, when they very rapidly attain their largest size, and it is also at this time that they require the greatest quantity of leaves. They ought never to be removed when sick.

The care of feeding the worms should always be entrusted to one and the same person, the duty being a most important one. Practice soon teaches the proper method of distributing the leaves, on which a great deal depends. The unpractised are apt to distribute the leaves unequally; giving to some too many, and too little or nothing to others.

If too much be given, there is a waste of leaves; and by giving less than the necessary quantity, the worm suffers; hence the worms advance unequally in their growth and one of our great objects is thereby defeated, which is to have all the worms pass through the various stages of their existence together.

The leaves, except in the hot season, should not be given during the day, immediately after being gathered, but kept for a few hours. They ought then to be separated, and the tender given to the young worms; the hard to the more advanced; and the hardest and from the older trees, to those in the last stage of their growth.

Great care ought also to be taken of the leaves that are gathered, especially those in the afternoon, for use during the night. They should be so kept as to prevent any fermentation occurring by their being heaped together, which would materially injure the insects. They should also be kept from exposure to the wind, lest they become too dry.

They may be placed in baskets, but not subject to pressure; or they may be kept in clean ground, all damp being avoided. Wet leaves ought never to be given to the worms. During the rains they must be dried before being used, by partial exposure to the wind. Even if they should not become dry before the time for distributing arrives, it is better to wait some hours for their proper drying; for to give them in a wet state would infallibly injure the health of the worm. Except in extraordinary monsoons, little delay is likely to occur in the Deccan from this cause, as there are always intervals of fine weather, when the leaves can be gathered dry. At this time if requisite, they can even be collected a day before they are wanted.

There is a variety in the color of the cocoons spun by the worms. Some spin a white cocoon, others a yellow, and others a sulphur or green one.

The time they occupy in coming to maturity for spinning also varies. Some commence spinning in 21 days, others in

29, others again in 35. According as these discrepancies are ascertained, the worms should be separated, and kept in different baskets.

The silk worm takes a few more days to spin during the cold and hot seasons, than it does in the temperate; nor is it then so strong either in constitution or appetite.

There is a difference observable in the constitution of the worms, according as the color of their cocoons varies.

It is only about a year and a half since I commenced rearing those that spin the white and yellow throughout their four stages. They eat more than the one making the sulphur cocoon, but there is a saving on the other hand in the quantity of food they consume, from the circumstance of their continuing about three days sick, whereas the latter is only about one and a half.

The white is very delicate and requires much attention. At the commencement of my operations I could only procure small and poor cocoons from them, and their eggs required a long time for hatching, and then not altogether, but they have since gradually improved. I attribute this improvement to the great care that has been bestowed upon them, as well as to the worms becoming better acclimated. I confidently expect a still further improvement.

The worm from which a yellow cocoon is spun, is also delicate, but not to such a degree as the above species, I had similar trouble with this worm at the beginning, but the improvement in the size and quality of its cocoons has been latterly very considerable.

The worm spinning a cocoon of a greenish color is more hardy than the others. It is better able to withstand changes of heat and cold. Its eggs are also more regularly hatched.

Throughout the year they come to maturity in 9, 12, and 15 days, and unless there is neglect, we may be certain of having good cocoons from them.

The three species of worms here noticed are, as to external appearance, little distinguishable from each other; but close observation will detect a difference.

When the worm is ready for spinning, it is seen to change its color and become yellow and transparent. It refuses all food, elevates its head, and keeps continually moving its body, as if uneasy.

This change takes place at night, and generally continues from 12 o'clock till 10 the next morning. This is not always the case, however, for in the cold and hot season they may be seen to begin to turn yellow and increase in color throughout the day.

Before they begin to spin, it will be necessary to make some preparation for their conducting the process with ease to themselves. The assistance to be given to them is this. Cut small flexible slips from the bushes or trees, and tie them up into small bundles not too thick or broad, and hollow. These, as soon as the worms are ready for spinning, are placed within the circumference, and in the middle of the baskets, so that the worm may easily creep into them and commence its labors; the majority will do this of their own accord, others require to be lifted and placed within the bundles.

In India the practice is to lift *each worm* separately, and place it in a basket, having its divisions, wherein the spinning is to proceed. This practice has several very great objections. It is very tedious and expensive, requiring the assistance of many persons in lifting so many worms, besides the cost of the requisite number of baskets, and the space they necessarily occupy.

The operation also takes so much time, that before all the worms can be collected and arranged, part of them lose their strength, and form small cocoons, and some form none at all, and this may be attributed also to want of care and skill in selecting worms that are not yet ready for spinning. Therefore, the best and indeed only plan, that should be followed, is the European method of bundles, which is both very economical and convenient; but to do that, it is absolutely necessary that the worms should be properly reared, in order, that they may be all equally prepared for

spinning. This process indeed ought to be in progress among the whole in two days or early on the third, and not be going on for six, eight and ten days (and more) as is not unfrequently observed in India.

It is also requisite to guard the worms against external injuries by giving them in charge of a person early every morning, whose duty should be to fill up the stones or coondies of the frames with water, for if this is neglected the worms will be destroyed by the ants, as they are found in great quantity. For their greater preservation, ashes should be spread around the coondies. The Worms are also liable to be destroyed by rats. Every strong narcotic odour, particularly the smell of tobacco, is very likely to prove injurious to them. No smoking therefore should ever be allowed among the Native Assistants in the rooms where they are kept.

They are very sensitive to the changes in the weather. It might hence be advisable to endeavour to keep them, as much as possible, in a regulated temperature, which should be preserved always the same. It will be necessary however, to take such care on this point, as always to open or shut the doors and windows, according as they become exposed to the sun, or a cold breeze, or may require, on the other hand, more air. This, when it is not too cold or hot, must be allowed, and when the insect has begun to spin and cover itself up, a greater supply of fresh air is beneficial.

During the six years that I have reared worms in Poonah, they never once had a disease.

I conclude this subject by strongly recommending great cleanliness to be observed in the treatment of the worms, as also, in the place where they are kept, which ought to be freely ventilated in order to remove all bad smells which cannot fail to be hurtful to so delicate an insect.

COCOONS.

The Cocoon is a species of kernel or nut, formed by the worm.

Upon every basket in which worms are spinning, a piece of paper should be placed with a memorandum of the day when the process of forming the cocoons commenced. We thus know when to remove the cocoons, as this should be done on the fifth day. On the third day generally, sometimes on the fourth, the insect has accomplished its labor and passes into the state of chrysalis.

The cocoons of different colours must, under every circumstance, whether intended for breeding or winding, be separated and kept apart, from each other.

When selecting cocoons, to obtain worms for producing eggs, the largest and hardest should be chosen.

The cocoons contain either male or female moths. The former are distinguished by being smaller than the others, more pointed at one or both ends, and depressed in the centre, and the latter are generally more round and full, and without ring or depression in the middle.

It is necessary to have an equal proportion of male and female moths.

On the 9th, 12th and 15th day, according to the season, and as I have already mentioned when treating of the hatching of the eggs, after the worm has begun to spin, the cocoon is pierced, and the moth issues.

The male moth is easily distinguished from the female. The first is smaller, and it is continually in motion, the last is larger than the male, and moves very little and slowly. The two sexes must be put apart for a few hours and afterwards one of each sex should be placed together for 6 hours, when they are to be separated, and the female placed upon paper or cloth. Although they have wings, these butterflies do not fly. In the afternoon of the same day and during the night, all the eggs will be laid.

From July to October we can calculate on 180 to 280 eggs from each moth. In the hot and cold weather, if proper precautions be not taken, about half of this quantity only will be produced.

This quantity, I have no doubt, of being by and by able

further to increase. At the commencement of my labors I was unable to produce one half of the above quantity. In Europe they get from 230 to 400.

The moth requires no food.

After copulation, the males may be thrown away, except when the number of females happens to be in excess, as this is the case some times. When this takes place, the best males should be selected to make up the necessary quantity, and separated one hour earlier, than the others, from the first set of females to which they have been attached, and then applied to the second set.

Every endeavour must be made to keep the eggs in as temperate a place as possible.

It requires at present about 22,000 to 24,000 eggs to form one tola weight, or 12 Poona massah, of the abovementioned species. As we improve, of course the eggs will become a little larger and will require less to form the tola, but the difference will not be great.

The insect contained in those cocoons, from which we intend to wind silk, must be destroyed before it makes its exit. If this be not done, the aperture left by it as it issues forth, spoils the cocoon for our purpose, for as soon as these are placed in water, they sink to the bottom of the pan, from fluid being admitted, and the texture of the cocoon is injured.

There are three plans of destroying the insect, while in the cocoon. The first is by exposure to the heat of the sun, the second by baking them, and the third by steaming them.

In the first method the cocoons are to be exposed to the sun for one or three days, according to the season. This system cannot be always followed during the monsoon on account of the rain, and from the days being cloudy. It is also liable to the objection, that the yellow and sulphur or green cocoon from such exposure loses its color, becomes pale, and the silk wound from it, is not so glossy.

The second is a more speedy one, and to which I give the preference, but it has also two objections, the first, from the

cocoon becoming too much baked, the fibres of the silk are burnt, and in winding, the threads break, there is great waste and the silk comes off imperfect. And, secondly, if it is insufficiently baked, the moth is not destroyed and still makes its exit.

This operation can be done in an oven, or by a trench in the ground two feet deep, and of an extent depending upon the scale of operations. The trench should be built up with pukka bricks and chunam.

A fire should then be made in it, which must be carefully attended to and kept burning gently. Over the trench should be stretched a kumblee, in which the cocoons are deposited in close and regular order, care being taken not to huddle them together in a mass.

The heat must be well regulated and the cocoons turned from time to time. In about an hour and a half the insect is suffocated. Two pukka seers of coal are sufficient to bake 8,000 cocoons.

The process of destroying the insect by steam, is a certain one and effected in about one hour, but in employing it, we should take great care before doing it, that the cocoons have no leaves or dirt attached to them. One cocoon in a dirty or unclean state will always injure any others in contact with it. Great attention is also required in placing them upon the frames that the baskets or whatever may be used, be perfectly clean, to prevent their contracting dirt, which they are the more liable to do from being taken wet from the steam.

The colour however and gloss of the silk from such process, is rather inferior to that produced from the cocoons that are baked.

Whatever method may be adopted with the cocoons, it is requisite to pay attention that the damaged ones be prevented from mixing with the others in the process, and for the first few days, that too many be not placed together, but filled up not higher than 2 or 3 inches, and be in a place to have free ventilation. They should be turned 3 times a day.

As they become gradually more dry, the pile may be raised, and the process of turning limited to twice a day in the first instance, then once, and finally omitted.

The weight of my best sulphur and yellow cocoons five days after the worm has begun to spin, and before being baked, has been, for 5000 cocoons, pukka seers (of 80 rupees each) 5 to 5½. From one maund there should be produced more than three seers and a half of fine silk, with such cocoons.

WINDING RAW SILK.

Experience has already shown that the Natives of this country are, from their habits and dispositions, particularly qualified for the work of winding silk, although so trifling a quantity has as yet been produced in the Deccan that they have not had sufficient practice, which is the principal requisite for performing this operation.

The first thing to be attended to previous to beginning to work, should be, to get good and dry fire-wood, so as to facilitate your having the water in the copper-boiler always at the same degree of heat, which is a very great object, as contributing to produce good silk and preventing an extraordinary waste of cocoons.

The quality of the water to be used in winding from the cocoons is also an important matter. The lighter the water the better. It should be kept in an earthen jar with some small round *river* stones and a few cuttings of vines, and exposed to the sun for two days before being used.

In about 5 to 8 days after the moth has been destroyed you may commence winding the silk. It should not be done earlier, as the cocoons being too fresh, the winding would not proceed well, neither should it be delayed too long, for then the fibres are liable to become too brittle.

In the first place the cocoons are divided into different assortments, according to their qualities.

1st. Those of the best quality, and hardest texture.

2nd. Of a middling quality.

3rd. Of a bad.

4th. Of very bad and damaged.

5th. Of the double, that is to say, such as have been spun by two worms and which contain two moths. These are very easily distinguished.

Before commencing reeling a preliminary operation also has to be performed in regard to the 1st, 2nd, and 3rd qualities, which is, to take off the floss or the first skin covering the outside of the cocoons.

In winding the cocoons, those of the worst qualities may be used first, as the best can remain longer without injury, even more than 40 days, except those of a *white colour*, which if kept too long, causes the silk to lose its whiteness; they should therefore be wound early.

Although the thread of wound silk appears so fine, it is not a *single*, but in reality consists of *several* fibres, as the single fibre would never be strong enough for any purpose.

The smallest number of cocoons that can be used together in winding, in order that their united fibres may form one thread, is three. The greater the number of fibres joined together, the more coarse will the silk become.

It must be observed, that the fibre of the cocoon, as it approaches to an end, becomes finer, when two of them can be considered only as equal to one fresh, therefore the person winding must be particularly attentive to adding a greater number of new or old cocoons, and calculate according as he finds it necessary. Practice in this, (which is a point of great importance) as indeed throughout the whole process, can alone point out the proper way.

The requisites for producing perfect silk and the attention required towards it, are the following :—

1st. To have good cocoons.

2nd. To brush them properly.

3rd. To preserve the water always at the same temperature, about 15 degrees below boiling heat, a greater or less degree to depend on the quality of the cocoons; for the harder the cocoons are, the hotter must the water be to dissolve the glutinous matter that exists in them.

4th. To have clean, pure and light water.

5th. To keep the reel performing its revolutions regularly, and not at one time with a quick, and another with a slow motion.

6th. The silk to be cleared properly from nibs and uneven threads: and finally and most essentially, to have an attentive person to wind.

The characteristics of perfect silk are evenness of thread, cleanliness or freeness from nibs, &c. purity of colour, glossiness, softness, and being well twisted.

About 250 cocoons may be put in the pan when the water is at the proper heat; according to the quantity of fibres the silk is to be wound of, whether fine or coarse and the ability of the reeler to do it quickly or slowly, as the cocoons must not be kept long under the process.

After the cocoons have been brushed, to loosen the fibres, they should be kept always close to the reeler, on his own side of the copper-boiler, and those that are at work should be kept separately, so that he may be able exactly to distinguish the number going on.

When the thread breaks, the reel should be stopped and the extremities of the thread joined, not with a knot but by twisting them a little with the fresh ones, as I do. If a person is at first unsuccessful (although it is not a difficult thing) let him place it under the skein to which it belongs.

The reeler must refrain from contracting the habit to which many are liable, of twisting in his hands the fibres when fresh cocoons are required to be added, as it would be wasting silk.

He must not neglect to make as many crosses as he can, the number of which, more or less, depends on the quality of the cocoons, and to see it going on, as sometimes it slips, and in that case he must stop the reel and put them again in order.

Every time that the cocoons placed in the pan have been reeled, the silk should be cleaned of its nibs, &c., and the boy

should take out all the grubs remaining in it and see the fire properly lighted.

At 12 o'clock the water remaining in the pan is thrown away, and replaced with fresh water for the afternoon.

The reeler should from time to time sprinkle cold water over the iron holes through which the thread passes, from a basin that he should have close to him.

During the days of heavy rain it will be best to discontinue the winding of silk, which is then liable to suffer in its glossiness and colour. The rains in the Deccan are however rarely so heavy throughout the whole day, or the atmosphere so close as to cause much interruption.

The Italian machine (which I use) requires two persons. One at the pan, and the other (a boy or woman) to turn the handle of the reel. It requires two reels, one of which may thus be removed at 12 o'clock along with the silk reeled in the forenoon, while the other is placed for the afternoon. In this manner the silk dries better, and we have also the opportunity of examining the first more at leisure and of removing all impurities.

The white silk is the finest and best, next the yellow, and then the sulphur.

As regards the quantity of silk that can be reeled in a day, I have had a native man wind one pukka seer of silk of $1\frac{1}{2}$ cocoons in 3 days, and a woman in two. I prefer the women and would recommend them, for although there can be no doubt that a man could do as much as the other, yet the women require less wages and are otherwise less expensive.

The length of the skein adapted for Europe is 36 inches; for this country it varies.

The quantity of fire-wood consumed in a day, in a furnace, is about 15 seers. The quantity however depends, in a great measure, on the furnace being properly built.

The best result I have as yet obtained from the cocoons, has been a consumption of 9,240, 10,080, 10,500 to 11,000 for one pukka seer of fine silk.

XXXII.—*A Chemical Examination of Cotton Soils from North America, India, the Mauritius, and Singapore; with some practical deductions.* By HENRY PIDDINGTON.

PART I.

IN a paper which the Agricultural and Horticultural Society of India did me the honor to publish, (No. XI. of Vol. III. of their Transactions,) I adverted to the cotton soils of America in these words: “now I have not been able to obtain specimens of the American cotton soils, but I have good authority for stating that the soil of the Sea Islands is wholly a calcareous sand, in other words a light chalky or shelly soil, so that it may probably contain from 50 to 60 per cent. of calcareous matter.”

And again, “but I would advise no man to attempt foreign cottons in a soil containing less than 15 per cent. of lime, and its iron mostly in the state of peroxide* or black oxide.”

Having, by the kindness of my American friends, Captain Land and Professor Harlan of Philadelphia, been able to obtain specimens of the Sea Island and Upland cotton soils of Georgia and Carolina from three of the best plantations, I have thought the facts elicited by their examination, in comparison with those of India, the Mauritius, and Singapore well worth publishing. The successful cultivation of good cotton is an object of such immense importance to India—it may indeed be called a question of millions to us—that no lights which can serve to direct our efforts into the proper channels, or save us from the expense and discouragement of unsuccessful trials can be indifferent: I commence with a sample of—

* An error of the press, it should be *dewoxide*; the *peroxide* is red.

I.—SEA ISLAND COTTON-SOIL, FROM GEORGIA.

The label sent with this specimen is as follows:—

“ In order to view this soil as it is, wet it, as though a shower of rain had fallen upon it: you can also view it dry.

“ N. B. These earths are selected from one of the best Uplands* and Sea Islands in Georgia.”

The appearance of this soil, when dry, is certainly very singular. It may be described as appearing like a mixture of fine, dark-grey sand *and charcoal dust* ! with fragments of shells, wood, twigs, leaves and even the shells of cotton seeds, the wood being in all states, from dry to charred, as if the rubbish of the cotton bushes had been burnt on the spot. Upon sifting nine ounces of the soil, taken fairly from the specimen sent, through muslin, it was found that eight ounces of it was fine sand, mixed with dark charcoal-looking dust; and the remaining ounce coarse sand, with a few fragments of sandstone in thin horizontal layers, shells in fragments, with wood and vegetable rubbish as described above.

It is unfortunately not mentioned in the label, nor in the letter, whether this is merely surface soil or a specimen taken a little below it. I assume it, from the rubbish, to be surface soil. The wood and twigs are evidently the remains of cotton plants.

We should also, at first sight, be inclined to suppose that the charcoal-like dust is derived from the burnt bushes; but, independent of its quantity, and that wood of any kind burnt in the open air would be mostly reduced to a white ash, I found, upon agitating a quantity of the soil in a tall glass jar, that a part of the black matter is dense enough to settle quickly after the sand; the remainder requires some time to repose, and in one instance the dark layers formed three-fourteenths of the *bulk* of the soil by measure: a portion of

* Referring to a box of Upland cotton soil, analysis 3.

it was no doubt black sand. The sand below, when thus wet and freed from the black particles, has a dirty brown (or greenish-grey) colour. I note below* some reasons for supposing this carbonaceous-looking matter to be derived from lignite, *i. e.* fossil wood half reduced to the state of coal, and this conjecture seems confirmed by the chemical examination; but the question of *how deep* this singular soil may extend, which is one of great interest, can only be decided by obtaining some of the sub-soil, say at two feet below the surface; and it is an instance of the importance of obtaining in all cases specimens of both the surface and under soils.

* The fragments of shells I found to be wholly of the mother-of-pearl sort, which, till burnt, effervesce but sparingly with acids, owing to the membranes which cover the calcareous matter†. They are not in sufficient quantity to entitle the soil to the epithet of calcareous, though from their slow decomposition, they would furnish the soil with calcareous matter for centuries. The soil also contains *some* lime independent of these, and muriate of lime is one of the saline matters found in it.

* Can this soil be derived from a variety of the formation which the English and American geologists call the ferruginous sand, or green sand, formation? I offer any geological conjecture with diffidence; but the grounds for it are,

1. The density and quantity of the dark-coloured matter.
2. The ferruginous sand is already found in North and South Carolina and in Georgia near Sandesville, which is not far from the banks of the Ogeechee river, at the mouth of which is St. Catherine's, the northernmost of the Sea Islands.—See Morton's *Synopsis of Organic Remains of the United States*, 1834.
3. Lignite is a common accompaniment of the ferruginous sand.—See Morton's *Synopsis*, p. 85, he quotes Boué, *Humboldt Tableau des Formations Géologiques* (who calls one of his sand series "*gres*" *secondaire à lignite*.) Cuvier, Conybeare, Phillips, &c.
4. The shells are too much worn and broken to be recognised but *seem* to belong to the genera *Ostrea* and *Gryphea*. On one of the fragments of sandstone is the impression of the furrows of a *Pecten*: all these shells belong to this formation.

† Hatchett on Shells.

I have stated above that I found one-ninth of the soil (*by weight*) to consist of matters which must be too variable in their occurrence and quantities to be considered as part of the soil, *i. e.* the shells, carbonized wood, coarse sand, &c. They, no doubt, by slow decomposition, influence and amend the soil, but these effects are too remote and obscure for us, in the present state of our knowledge of agricultural chemistry, to take account of; and the analyses which follow relate, it will be understood, to the sifted or "finely divided"* portion of the soil.

Three-fourteenths *in bulk* of it was found, as before said, to consist of the dark charcoal-looking matter, but some of this was very dense and settled immediately after the sand. It was probably only sand coloured by black oxide of iron and a little of the carbonaceous matter.

Upon separating carefully the light upper layer it was found, when dried, to be a dark slaty-black powder, and, upon burning some of it in a glass tube the peaty, acrid and highly disagreeable smoke which characterises the peats and lignites, and which all who have smelt a peat fire can recognise, was plentifully evolved; silver leaf and litmus-paper were discoloured, a dense smoke evolved, and a brown, oily, acrid and smoky-tasted matter deposited on the upper part of the matrass. Cold water left for a day or two upon a portion of it was tinged of a pale yellowish colour and left a brown extractive matter when evaporated. Alcohol digested upon it acquired but a faint tinge, and left but an insignificant residuum, which was probably what its water had taken up.

It follows then that a portion of this dark sediment is, as I have suggested, lignite, or peaty matter, in the state of very fine powder; and as it is so intimately mixed with the soil, and forms as to bulk a considerable proportion of it, we may suppose that it essentially modifies its properties. The

* Davy, Agricultural Chemistry.

facility with which it colours water is much in favour of its being important to the growth of the plant and the peculiar quality of the cotton. I found that the fine, sifted part of the soil, as before mentioned, contained in 100 parts—

Saline matter, muriates of lime and soda, but no potass,	0.20
Vegetable matter, mostly lignite or peaty powder, with a little water,	3.20
Iron, (protoxide,)	1.00
Lime,	2.76
Alumina,	0.20
Silex,	92.00
	<hr/>
	99.15
Water and loss,	85

100.00

The saline matter was wholly composed of muriates of lime, and soda: no sulphates, or potass could be detected, though these are seldom absent from inland soils. It was to be looked for, indeed, that soda would take the place of potass in a marine soil. The saline matters, trifling as their proportion appears, are always considered of importance to the crop*. In appreciating this soil, we must make an allowance for the broken shells, which are always slowly decomposing and furnishing fresh calcareous matter to the soil. These have been excluded in the sifting, but it will be remarked that this and the following analysis of another specimen do not show the soil to be *so* calcareous, as I had been led to suppose. The examination was indeed repeated to guard against error in this respect, and to be assured also that the proportion *by weight* of the peaty matter, which appears so large by bulk, was correct.

Another peculiarity of this soil was the state of the *silex*. In many of the soils of Bengal, and indeed in all soils the

* Though it will be seen in No. 3, and at No. 5 that they are not indispensable to cotton.

origin of which is *decomposed* rocks of any sort, the silex is obtained, for the most part, in the state of an impalpable white powder; or in other words like fine flint-dust. When the soil on the contrary is derived from *disintegrated* rocks the silex is in coarse grains, like coarsely-broken flint. In this the silex was almost wholly of the latter description, being in bright white grains like pounded loaf-sugar. It is essential to remark this, for silex, *i. e.* flint, in coarse grains and silex in fine dust must act very different parts in the soil, both as regards its relations to moisture, its tenacity, and its electrical properties*.

2.—SEA ISLAND COTTON-SOIL, FROM DR. HARLAN OF PHILADELPHIA.

I have no further account of this specimen than that it is a good Sea-Island cotton soil; Dr. Harlan's letter describing the locality not having reached me, and there is no label with the box. Like the former it is evidently from the surface, being full of rubbish, fragments, and roots of grasses, &c., which indicate it as such. It differs too from the foregoing, in being of a tolerably uniform brown colour when sifted.

When agitated with water a portion of fine brown matter is slowly deposited on the more dense and sandy particles, and this the test of burning showed to be like the black powder of the first specimen, a peaty substance, which affords the same acrid smoke and oily deposit, and discolours silver-foil and litmus-paper: it is evidently brown lignite or peaty powder: the lignites and peats running by insensible gra-

* I have in preparation, and in considerable forwardness, a work on the analysis of soils in which these remarkable differences are more fully adverted to than I can here do. We have hitherto been satisfied with knowing the constituents of the soil (and these but imperfectly); the *state* in which these exist is wholly overlooked.

dations into each other. The water is very slightly discoloured.

When sifted, about one-eighth of the soil was found to be composed, as before, of coarse sand, vegetable rubbish, fragments of shells, &c.

The analysis gave in 100 parts—

Extractive and saline matter, (mur. of lime and muriate of soda,) but no potass,.....	0.60
Vegetable matter, mostly lignite or peat in powder,	5.00
Iron, (protoxide,)	1.30
Carbonate of lime,	4.00
Alumina,.....	0.63
Silex, coarse grains,	88.02
	<hr/>
	99.55
Water and loss,.....	45
	<hr/>
	100.00

3.—UPLAND COTTON-SOIL, FROM GEORGIA.

This soil is the one referred to in the label of No. 1, where it is said to be from one of the best estates. It is evidently too from the surface, and, in appearance, much resembles our common light, fawn-coloured, sandy soils of lower Bengal, but, upon sifting, it was found that nearly one-half, by weight, was coarse granitic sand, mostly silex, with a few minute fragments of felspar and shells; the last too small to afford any idea of what genera they belonged to. There were also some vegetable remains, mostly from cotton bushes, and, as before, the part which passed through the muslin sifter is taken for analysis, the rest being looked upon rather as rock, slowly decomposing and disintegrating, than as soil, now serving to the growth of the plant.

Upon agitating a quantity of this sifted part in water, no difference of colour appeared as it settled*, but as usual the finest part settled last, and in twenty-four hours the water was slightly tinged. Upon heating a portion in a matrass the acrid smell of the peats and lignites was evolved, and it discoloured litmus-paper and silver foil, depositing also the brown oily matter in the upper part of the tube, thus establishing a close analogy with the Sea Island soils.

Its light colour indicates that the lignite or peat is not of the black kinds, and that its iron is probably in the state of protoxide, while that of No. 1, it will be remembered, is probably wholly deutoxide: these differences should not be lost sight of. There were no saline matters found in this soil! The water in which it was boiled had a light brownish-yellow tinge, which, upon evaporation was found to be occasioned wholly by a brown extractive matter (*Geine* of Berzelius?) with a minute trace of lime only. No potass, muriates or sulphates were present.

The analysis gave in 100 parts—

Extractive matter, but no saline,	0.10
Vegetable matter, peat or lignite,	4.60
Iron, protoxide,	1.25
Alumina,	1.00
Carbt. lime,	2.90
Silex, coarse grains,	89.35
	<hr/>
	99.25
Water and loss,	75
	<hr/>
	100.00

It is very remarkable, as showing the wonderfully minute state of division in which the vegetable matter is diffused throughout this soil, that though, by weight, it constitutes only 4.60 per cent. of it, yet at one period of the calcination, which is the process for ascertaining this, the whole contents of the crucible, seem changed into *ivory black!*

* See note at page 207.

It follows then that, so to speak, every fibril of the roots of the plant and every drop of water in the soil must come into contact with an atom of this substance: a strong presumption of its great importance in modifying the food, and consequently the production, of the plant.

The absence of all saline matter too is a fact of very great interest, for it shows that on the Upland soils certainly, and perhaps, or indeed probably, on the Sea Islands, the production of fine cotton does *not* depend on the presence of any peculiar salts; and we thus arrive a step nearer to knowing with certainty upon what it *does* depend.

Reserving general considerations for the conclusion of this paper, I come now to the consideration of the Indian Cotton Soils.

4.—BEST KIND OF COTTON-SOIL, FROM BUNDLECUND.

I am indebted for this specimen to the kind attention of Colonel Dunlop and T. J. Turner, Esq. Commissioner of the Bundlecund division. The note which accompanies it is as follows:

“The inequality of surface throughout Bundlecund is a matter of notoriety, and lands well calculated to yield a good crop from the nature of the soil are often rendered useless for the growth of cotton by the quantity of water which they retain, in consequence of being on a lower level than that of adjoining fields. The soil varies considerably and may be classed as follows:—

“1st. The *Mar* or *Marrah*, which is the black soil, and the most productive of the country.

“2nd. The *Qobir* or *Qobura*, containing a mixture of black soil and sand.

“3rd. *Pundooah*, of a reddish color and tenacious or clayey.

“4th. *Seegwan*, light-colored and sandy.

“5th. *Rankur*, abounding with small kunkur stones.

“6th. *Dandee*, consisting principally of kunkur.

“ The order in which I have mentioned the different kinds of soil is that according to which they are valued for arable purposes. That which I now send you is of the first class and best suited to cotton, provided it does not lie low so as to retain the water.”

This soil, which is from the surface, approaches in appearance to what, from the descriptions, we should suppose to be the *Regur* or black Cotton soil of Southern and Central India, which I have not seen: perhaps indeed it is identical with it? Its appearance when dry is that of a dark-brown heavy clay, interspersed with small white nodules, which are soft *kunkur**, so that the whole is easily pulverised. It forms with water a tenacious clay, and dries into tough lumps, giving every indication of being what the black soil for cotton is described to be, viz. “ a soil produced by the decomposition of trap rocks, forming a tenacious mud in the rains, and drying into a hard black clay crossed by innumerable deep fissures and cracks in the hot winds.”

When heated in the matrass, a striking difference appears between this and the American soils in *the total absence of any trace of lignite or peaty matters!* It gives out nothing but pure water, with scarcely any smoke or smell, and with no effect whatever upon the silver foil and litmus-paper inclosed in the tube. In calcination too its darkest appearance is a dull lead colour, and, as will be seen, its vegetable matter does not exceed 2 per cent.

The proportion of lime, though, is far above that of the American soils, being 12 per cent., while the highest of these is only 4 per cent. The silix too is in this in the state of a fine powder as alluded to in p. 203, evidently showing it to have been derived from the *decomposition* and not from the

* *Kunkur*. A singular calcareous concretion, stratified and in mamillated masses of all sizes, containing from 50 to 80 per cent. of carbonate of lime, some magnesia, iron, and alumina; interspersed, sometimes in large quantities throughout extensive tracts of the alluvial and secondary formations of India. The analysis of some average samples gave me from 70 to 50 per cent. of carbonate of lime; some by Mr. James Prinsep, gave from 84 to 59 per cent.

disintegration of rocks. I advert to these as forming marked differences to which I shall have occasion to refer at the end of this paper.

100 parts of this soil gave—

	Dr. Spry from a Quobura soil*.	
Extractive matter with a trace of carbonate of soda,	0.33	} 2.15
Vegetable matter with a little water,	2.00	
Iron <i>deutoxide</i> ,	7.75	6 05
Carbonate of lime,	11.90	8.25
Alumina,	3.10	4.40
Silex,	74.00	73.15
	99.00	93.90
Water and loss,	1.00	6.10
	100.00	100.00

5.—COIMBATORE, OR *Oopum* COTTON-SOIL, FROM SOUTHERN INDIA.

This soil, with many others of various sorts to which I have not yet been able to pay due attention, was kindly sent me by Dr. Wight of the Madras Establishment. He was not able to obtain any notes upon it, farther than that it is considered one of the best cotton soils of Southern India.

In appearance it seems also to be a variety of the black or *regur* cotton soil, being of a dull black colour and highly tenacious consistence, but modified in this respect by the intermixture of a quantity of gravel of felspar and silex, but

* While this paper is passing through the press I am favoured by Dr. Spry with a copy of his work "Modern India," in the Appendix to which, Vol II. page 273, I find he has given analyses of four of these kind of soils, from Bundelcund. I have annexed here his analysis of the best sort of kabur (or quobura of Mr. Turner) reduced to the same kind of process as employed by me; that is to say, he has taken the soil as brought in, and considers one-tenth of it as water, while mine has been dried to 212° or higher. Hence, by adding one-tenth to his proportions, we obtain those which I have placed here. Dr. Christison's analysis of the black cotton soils I have been unable to refer to.

not of *kunkur*. This gravel forms about $\frac{1}{8}$ th of the weight of the specimen sent me, which was a very minute one, not exceeding half an ounce, so that I am precluded from giving a more extended detail of its appearance and sensible properties.

Like the Bundlecund soil it yields only pure water when heated in the matrass, not discolouring test-papers, nor silver foil, and the only saline matter found in it was a minute portion of muriate of lime.

The examination of it gave in 100 parts—

Vegetable matter with a little water,.....	2.30
Saline matter, (muriate of lime,) no potass nor sulphate present,	traces.
Carbonate of lime,	7.50
Magnesia,	traces.
Iron, protoxide,	4.00
Alumina,.....	2.80
Silex,	82.80
	<hr/>
	99.40
Loss,.....	60
	<hr/>
	100.00

6.—SOIL ON WHICH THE BOURBON-SEED COTTON IS CULTIVATED, FROM SOUTHERN INDIA, TINNEVELLY DISTRICT.

There is no descriptive label with this soil, which is like the preceding one sent me by Dr. Wight, and is, I believe, from the Tinnevelly district. The Bourbon cotton, he informs me, is grown successfully upon it. Some of this from Madras *has* realized as high as 11*d.* per lb. at home, or even more.

The appearance of this soil, which is of an entirely different class from the preceding, for its iron is wholly in the state of *peroxide* or red oxide, with perhaps a little carbo-

nate of iron, is that of a mixture of lime-rubbish and yellowish earthy brick-dust. The larger nodules of *kunkur* have the sharp angular points which this substance so often presents, giving it somewhat of the mamillate form. It may in fact be called a coarse yellowish-red soil, internixed with *kunkur* in small nodules and fragments. When sifted almost the whole of the coarse part was found to consist of the *kunkur* with a few fragments of silex, felspar and aluminous earth. The finer part was a coarse yellow-reddish powder, speckled with the white fragments of the *kunkur*, and as only about one-half of it passed through the sifter, we may say it is composed of equal parts of the coarser fragments and finer powder; which last is the analysed portion.

In the matrass this soil also evolves nothing but pure water, not discolouring test paper nor silver foil; a minute portion of muriate of lime and sulphate of soda also exist in it, and, from the appearance of it and its change in the crucible, I should infer a portion of the iron to be carbonate of iron, for it at first takes a dark ash colour and then calcines to a dull red, which is the usual appearance shown by this substance.

I found 100 parts of the fine powder to contain—

Extractive (Geine ?) and saline matter; this last		
muriate of lime and sulphate of soda,	..	0.20
Vegetable matter,	.. ..	0.15
Iron peroxide (and some carbonate ?)	..	2.88
Carbonate of lime,	.. ..	19.50
Magnesia,	.. ..	0.15
Alumina,	.. ..	2.00
Silex,	.. ..	74.00
		98.88
Loss,	..	1.12
		<hr/>
		100.00

7.—COTTON-SOIL, OF THE BEST QUALITY, FROM THE MAURITIUS.

This soil is from the Black River, the estate of my worthy friend M. Genève Senior, who informs me that it is considered as one of the best cotton soils in the Island. It is labelled as,

“ Soil from near the sea-shore, good for cane, superior for cotton.”

This is also quite different from the others, I mean of a different *class*. Its appearance is that of a dull black soil, intermixed with a very large proportion of white fragments small and large, some appearing to be remains of shells but most of rock. There is also a considerable number of dark-coloured pebbles, rolled and in fragments, which seem to be portions of the soil indurated by iron, and much resemble minute nodules of kidney iron ore. There are also fragments of vegetable remains, having somewhat the appearance of brown lignite.

When agitated with cold water it discolours it almost as much as the Sea Island cotton soil, No. 1, and like it too, a part is a very fine, dark-brown powder slowly settling. When heated in a matrass it gives out a faint peaty odour, but of a more earthy kind than the Sea Island, and the test paper and silver foil are not immediately discoloured by it. Upon calcining, it blackens very considerably. When sifted, about one-third is coarse gravel, of which at least three parts are calcareous fragments, the remainder the indurated nodules, &c. and fragments of lignite described above. The saline matters, which were less abundant than would have been looked for in such a situation, were only muriates of soda and lime, without any sulphates or potass. The examination of this soil showed it to contain,

In 100 parts—

Saline and extractive matter, the salts muriate soda and muriate lime,	0.30
Vegetable matter,	1.75
Carried over,...	2.05

upon the analysis, No. 1, viz. that these too are not of primary importance. We find too that the carbonate of lime is in such very small proportion that we may consider this soil as a mixture of silex and vegetable matter, this latter being in a very soluble state.

9.—INFERIOR SINGAPORE COTTON-SOIL.

This soil is also from Mr. Crane, who says it is far more common than No. 8, but that it always yields cotton of an inferior quality, which will not be wondered at when its composition is considered; but like the preceding one, it is very highly instructive.

It is a coarse-looking, white sand, with about one-fourth of its gravel, which is all siliceous, too coarse to pass the sifter. Intermixed with it are a very few fragments of carbonized moss and minute particles of carbonaceous matter.

In small quantities—and I had but very little of it—it does not sensibly colour cold water, but though, as will be seen, its carbonaceous matter only forms *by weight* one hundredth part of the soil yet, upon heating it in a matrass, the peaty smell is evolved, the silver foil discoloured, and the oily matter is deposited in the tube!* The litmus-paper is also discoloured if the tube is kept closed for a few hours, so that we find it, like the preceding one, to belong to that class of cotton soils which possess peaty matter, and it seems almost as if this was an experimental soil, formed by the hand of Nature for us, to shew that this substance alone is sufficient to the subsistence of the plant and the production of passable cotton; for we may call it, in fact, a pure siliceous gravel and sand, with only one per cent. of peaty vegetable matter! the iron and lime, together not amounting to

* To the chemist there is nothing extraordinary in this, but to the practical man it may serve as an example of the delicacy of our tests, which here show perhaps the 500th part of a grain of sulphur in the peaty matter.

fifteen hundredths of a grain in 100 grains ! so that, as before remarked, neither the saline matter as shown by Nos. 3 and 5 nor the iron as shown by No. 8, nor the lime as now shown, are essential ingredients to the mere production of cotton ! I defer further remarks until discussing the general results.

The analysis gives in 100 parts—

Vegetable matter, (probably all peaty,) ..	1.00
Iron and carbonate of lime, traces, say— ..	0.15
Silex, coarse-grained,	98.83
	<hr/>
	100.00

I close this first part with a Tabular view of the preceding analyses, and in Part II. proceed to comment upon them.

Tabular view, with notes, of the Analyses of Cotton-soils in the preceding pages.

No.	Cotton Soils.	Vegetable matter.	Saline, and extractive, gelatine &c.	Iron.			Carbonate lime.	Magnesia.	Alumina.	Silica.	Water & loss.	Price of best Cottons in Liverpool.	Remarks.
				Protox.	Deutox.	Tritox.							
1	AMERICAN. Georgia Sea Island,	3.20	0.20	1.0	...	...	2.75	...	0.20	92.00	0.95	d.	Vegetable matter peat or lignite; partly soluble in cold water. Silica in coarse grains. Ditto.
2	Supposed Georgia Sea Island.	5.00	0.60	1.30	...	...	4.00	...	0.63	88.02	0.45	2½	Vegetable matter peat or lignite, but nothing soluble in cold water: no saline matters.
3	Upland Georgia,	4.60	0.10	1.25	...	...	2.90	...	1.00	89.35	0.75	12	No peat or lignite. Nothing soluble in cold water. Silica in fine powder: <i>kunkur</i> in the gravel. Gravel mostly silica with some felspar, but no <i>kunkur</i> .
4	INDIAN. Bundelcund,	2.00	0.33	...	7.75	...	11.90	trace	3.10	74.0	1.00	5	Gravel almost wholly <i>kunkur</i> . Some carbonate of iron. Half the soil of gravel.
5	Coimbatore,	2.30	traces	4.00	...	...	7.50	trace	2.80	82.80	0.60	5	Silica mostly coarse-grained. Gravel mostly calcareous.
6	Bourbon-seed cotton (Tinnevely?)	0.15	0.20	...	...	2.88	19.50	0.15	2.00	74.00	1.12	10	Vegetable matter mostly peaty and very soluble.
7	MAURITIUS, SINGAPORE.	1.75	0.30	9.15	...	...	40.85	trace	2.50	43.60	1.65	12?	Vegetable matter peaty.
8	Best soil,	9.15	0.60	...	0.25	...	1.25	...	...	88.20	0.55	9	Vegetable matter peaty.
9	Inferior soil,	1.00	...	...	0.71	...	0.07	...	...	98.85	...	4	Vegetable matter peaty.

PART II.

IF the merely practical Agriculturist has perused me so far, he will say no doubt "all this is well and good and highly curious, but wherein consists the utility and advantage which I am to derive from it?" The reply to this question will be found in the following observations.

Let us first refer to the Tabular view of the analysis with the notes to it, and we shall be struck with the differences exhibited by different *classes* of soils*. We see that all the American, the Mauritius, and the best Singapore soil, producing the finest cotton, contain a considerable percentage of vegetable matter under the form of peat or lignite, in a state of exceedingly minute division, and, in many of them, some part of it is easily soluble in cold water. We see too, that the Indian soils contain very little vegetable matter, and this wholly insoluble in water, but that the best contain a far larger proportion of carbonate of lime, and some of them their iron in a different state from the others, though it would partly seem, by the by, that the plant is indifferent about the iron. Still as we do not know what is the part which the iron plays in soils (it may be as influencing their electricity as well as their tenacity and relations to moisture), we must always keep this in mind as a matter to be inquired into.

* Writing for the practical man as well as for the scientific Agriculturist, I shall be excused if I remark here that we are not yet arrived at that degree of knowledge which will enable us to say *positively* what makes one soil more fertile or more proper for a particular plant than another; and this arises not only from the imperfectness of our chemical analysis, but because vegetable physiology has not yet told us *exactly* what is the food of plants and how they obtain that food. We are in short in the inquiring stage of our knowledge; in that stage at which we begin to ascertain broad differences, and to set up theories founded upon them, which are perhaps to be wholly or partly abandoned when we have obtained more light. I shall advert shortly to an instance of this in my own theory that carbonate of lime was the essential to good cotton soils.

I have remarked in the preceding note, that we do not certainly know what plants feed upon, nor entirely *how* they feed, *i. e.* by their leaves or roots. What we know is that many substances are taken up and absorbed by the roots and leaves, and that a system of excretion is constantly going on by which many of these substances, or some of their elements, are thrown off, while others remain fixed as parts of the plant; and when we desire to obtain any particular substance from a plant we look to find it, or its elements, most abounding in the best soils for it. With cotton this element is *carbon*—in plain English charcoal,—of which its solid matter is almost wholly composed. Its seed, which is very oily, contains also a considerable proportion of hydrogen united to carbon, which is the basis of the oils, and, for what we yet know, the quality and quantity of the cotton may depend upon the vigour and nourishment of the seed*; and it is quite possible that, in the peaty matter of the best soils, the plant may find the carbon united to the hydrogen ready for its nourishment? The size of the Sea Island seed is very remarkable, and seems to lend some countenance to this idea, and if, as said (by Mr. Baines or my friend Dr. Mease of Philadelphia?) it was originally from Bourbon; it has nearly doubled; I do not know whether it has decreased in number.

Assuming however, for our present purpose, that the quality and quantity of the cotton depends upon the supply of carbon to the plant, we find that in the best, *i. e.* the American; No. 8 from Singapore; and the Mauritius soils, the plant finds not only carbon in a highly soluble state, but probably also the hydrogen united to it in the peaty matter; while those next in value possess also larger shares of carbon but without the hydrogen, which the plant must now obtain from

* Every one who, when a school-boy, has blown the down from the sow-thistle or dandelion, may have remarked the difference between the long tufts of it on the seeds of a fine vigorous plant, and the short stunted supply on those of a half-starved one. The scientific botanist will perhaps remark that the *appars* of a *Leontodon* is not the hair on the seed of a *Gossypium*, but in truth this is the nearest analogy which strikes me to illustrate my supposition.

the water of the soil ; and that the carbon itself is in a state requiring a decomposing process before it is fitted to become food for the plant ; for it is now bound up with the lime in the state of carbonate of lime ; that is, that the carbonate of lime (in plain English the marble, chalk, or kunkur) is composed of 12 per cent. of carbon, 32 per cent. of oxygen and 56 per cent. of caustic lime, so that as the 12 per cent. of carbonate of lime which we see contained in the Bundlecund soil contains 6·72 of *caustic* lime and 5·28 per cent. of carbonic acid, and this last again is decomposable into 1·44 per cent. of carbon and 3·84 per cent. of oxygen, the soil may be said to have this quantity of carbon, *i. e.* 1·44 per cent. for the supply of the plant. This will not seem far-fetched when we reflect that every drop of rain which meets with a particle of *kunkur* dissolves a minute portion of its calcareous matter by the excess of its carbonic acid, and carries it in solution to the plant*. It follows then that, as I supposed, the lime in the soil is, though not indispensable, as we see in the Singapore soils Nos. 8 and 9, highly useful, because of the carbon which is always united to it ; the lime, if any is taken up, serving only perhaps as a stimulus to its digestion.

I am not wholly writing here from theory, but am enabled in addition to the curious proofs which the Singapore soils afford us, to prove something from practice. I brought from Singapore, where I superintended for a short time the Honourable Company's garden, in 1822, seeds of the Bourbon Cotton which had been recently brought there. These I planted in 1823, and cultivated the produce for seven or eight years, not as an object of culture, being then extensively engaged in other pursuits, but as a curiosity and an experiment. At the end of this time, during which I had always good and

* I found on evaporating the drainings from some fresh *Polay*, the fertilising mud of the Ganges so called, that, though perfectly limpid in appearance when filtered, they were so highly charged with carbonic acid as to hold a considerable portion of carbonate of lime in solution. See a paper "On the fertilising principle of the inundations of the Indian Rivers" in *Phys. Trans. As. Soc.* Vol. I.

often abundant crops, it was found, on sending samples of the first and last year to Mr. Finlay of the Glo'ster Mills, that the cotton had not in the least degenerated! and was worth from 9d. to 11d. per lb. Now the soil in which these plants grew I analysed, and found to contain in 100 parts—

Water,	..	..	..	..	1.00
Saline and extractive matter mostly the first, .					0.50
Vegetable matter,	..	..	..	..	0.50
Carbonate of lime,	..	..	..	..	1.00
Oxide of iron; perox and protoxide,				..	6.00
Silex,	..	..	..	..	84.50
Alumina,	..	..	..	..	5.00
					<hr/>
					98.50
			Loss,	..	1.50
					<hr/>
					100.00

It therefore contained but exceeding minute portions of lime and carbonaceous matter, but then the plants were constantly manured every year with the black peaty earth (*Bodh Matti*) so abundant in the jeels of India, of which an average good specimen contains in 100 parts—

Water,	..	..	..	..	1.50
Saline and extractive, mostly extractive,				..	0.25
Vegetable matter,	..	..	..	..	26.00
Lime,	..	..	..	..	15.00
Iron; deutoxide,	..	..	..	..	9.50
Alumina,	..	..	..	..	-8.00
Silex,	..	..	..	..	36.50
					<hr/>
					96.75
			Water and loss,	..	3.25
					<hr/>
					100.00

Here it is clear that the plant found its supply of carbon from the vegetable peat, and the lime, if it wanted any, from the shells with which this substance abounds.

It occurred to me that there might be found some relation between the whole quantity of carbon in the soils and the quality, as shown by prices, of the cotton produced upon them, and, upon trying it, I find a sufficient general relation to allow the table of results to remain ; though one or two instances are what may be called *outstanding* ones.

I assume first that the whole of the vegetable matter destructible by heat, as shown by the analysis, furnishes carbon to the plant, more or less readily as it is more or less soluble ; and that the remainder is furnished by the carbonate of lime of which as $\frac{4}{100}$ ths are carbonic acid, and one-twelfth of this fraction carbon, we may say that, in round numbers, 4 per cent. of the whole quantity found is carbon contributing to the nourishment of the plant and the perfection of its cotton. Of the extractive (or *geine* ?) I have not taken notice, considering it always as furnished by the decomposition of the vegetable matter. Tested by this theory our table of soils gives the following results.

Table exhibiting the quantity of Carbon in the different soils analysed.

No.	Soils.	Carbon from vegetable matter.	Carbon from carbo. lime.	Total carbon per ct. in the soil.	Means.	Value of Cotton per lb.	Notes of allowances to be made when comparing these results.
1	Sea Island, ---	3.20	0.11	3.31	} 4.23	d.	{ Vegetable matter very soluble and of the peaty kind—Climate? Long and careful culture of plant. Best preparation of the cotton for market. Short voyage*.
2	Ditto ditto, ---	5.00	0.16	5.16		24?	
3	Upland, ---	4.60	0.12	4.72	---	12?	{ Vegetable matter sparingly soluble in cold water; otherwise as above.
4	Bundlecund, ---	2.00	0.47	2.47	} 2.53	5	
5	Coimbatore, ---	2.30	0.30	2.60		---	---	{ Vegetable matter insoluble. Inferior kind of Cotton cultivated? Bad preparation? Long voyage?
6	Bourbon Seed, Tinnevely, ---	0.15	0.78	0.93	---	10	{ Kunkur gravel contributes also to supply of carbon; see p. 13. We may therefore call this at least 2.00 of carbon in the soil.
7	Mauritius, ---	1.75	1.63	3.38	---	12	{ Fine description of Cotton cultivated. Price would be higher if more was produced.
8	Singapore, best,	9.15	0.05	9.20	---	9	{ Vegetable matter very soluble but the rest nearly pure sand. Amateur cultivation.
9	Ditto inferior,	1.00	---	1.00	---	4	{ A mere sand.

* Surely the length of time that Cotton remains packed must influence the strength of the fibre?

Closing here my general observations I now put into the form of precepts for the use of the practical agriculturist what at present appears to me to be the results to be drawn from the foregoing pages. He will not fail to remember that this is not *certain* knowledge,—that is, it has been tested by experience but to a limited extent,—but only the amount of what we at present know, and what these researches have, I think, elicited; and that I speak here simply of soils, without reference to climate or situation: I suppose the cultivator to have obtained good varieties of the plant.

1. It seems *at present* that the abundance and fineness of good cottons depend on the quantity of carbon in the soil *and the solubility of that carbon**. If therefore you can obtain a soil approaching to what is described in speaking of the American soils, that is, containing peaty matter, and lignite, and colouring cold water, this will no doubt be the best; because it contains carbon, and probably hydrogen combined with it, suitable for the food of the plant.

2. The next best soil is one containing carbonate of lime; as marble, common *kunkur*, chalk, shells, &c., all of which contain more or less of this, and in India *kunkur* will most frequently occur. The Bourbon-seed soil from Southern India, No. 6 of the tables, is a strong example of this.

3. The soil should not be too tenacious. You will observe that Bundlecond, No. 4, grows only cotton worth 4*d.* or 6*d.* and the objection to soils not throwing off their water quickly is adverted to in the note sent with it. All experience indeed goes to shew that the tenacious soils do not suit for fine cotton. I have had repeated experience of this in Bengal; and on the Bombay side of India I observed some-time ago that a Parsee gentleman, Furdonjee Cowasjee, had

* The solubility. We are told that the Sea Island Cotton "is so capricious in its growth that the "same soil" on the firm land though but a short distance from the sea will not produce it!" To the eye of the cultivator, these might truly appear to be *the same soil*, but he will easily now see the difference, *i. e.* that there is something in the vegetable matter which colours cold water.

partly failed, or experienced much loss, in some experiments in cotton, in consequence of the clayey nature of the soil, which retained too much moisture. In the West Indies, the years of drought are far the most favourable to the cotton crops*, and the Singapore soils are instances of cotton growing in what might be called pure sand with vegetable matter; but we must probably make allowances in these instances for the vicinity of the sea.

4. As to colour we can say but little; for we have good and fine cottons from grey and fawn-coloured soils in America, from a black one at Mauritius, from a red one in Southern India and from a white one at Singapore. The colour is owing to the iron, and to the vegetable matter; and something *may* depend on the state of the iron, though we do not know yet what, and how it acts. The Singapore soils indeed seem to exclude it as an indispensable element, and the Bundelcund one to shew that in larger proportion it is objectionable (perhaps as augmenting their tenacity?) unless as in the case of the Mauritius soil, No. 7, it be also accompanied by a larger proportion of lime. We want, in fact, more knowledge on this part of our subject.

5. The state of the silix, *i. e.* the pure sand, of the soil seems certainly of importance, for we find that in all the best cotton soils it is *undecomposed*, being in coarse, glittering grains like pounded loaf-sugar, the silix produced from decomposition of rocks being in a fine dusty powder. Hence the coarse sandy soils, if they contain a sufficiency of other ingredients, do not seem objectionable.

So much for the choice of a soil. We have now to con-

* Depon's History of Carracas adduces a strong instance of this. He says Vol. 1. p. 419, English Translation—The Parish of Tron, situated in the Northern part of St. Domingo, experienced five years of extraordinary drought which commenced in 1772. The plains covered with sugar-canes and the hills cultivated with coffee were afflicted with a desolating sterility. M. Chevalier, an inhabitant of that quarter, took occasion in 1775 to sow his grounds with cotton and reaped prodigious crops. All the sufferers by that calamity imitated his example.

sider how to amend those already in use, or desired to be made fit for the cultivation of cotton.

Manures may be conveniently divided into manures for the soil in general, that is, such as amend or alter its texture or properties for a number of years; and manures for a particular crop, which we do not look to have benefit from for more than a year or two. I suppose the Indian Agriculturist, for whom I am writing, to be desirous of either, as the case may be.

1. Of manures for both the soil and crop. The first to be sought for, perhaps, is Lignite, which, abounds in some parts of India; but it should not be forgotten that the lignites and the inferior sorts of coal run very much into each other, so that the one may easily be taken for the other, and there is great risk in using the last, for it generally contains iron pyrites, by the decomposition of which sulphate of iron (green copperas) is formed, and this is highly pernicious to plants. This kind of manure then should not be ventured upon extensively without advice from competent persons. If by accident sulphate of iron should be formed in the soil the remedy is lime, which converts it into sulphate of lime and carbonate of iron; both highly beneficial to plants.

2. Peat is the next kind of manure. The jeels and many tanks of lower Bengal and other parts of India abound with the black peaty substance called in Bengal *Bodh Matti* to which I have alluded in page 220. This is probably the best manure either for the soil, or for the plant only, as the supply may be more or less abundant.

3. *Kunkur*, chalk or limestone of any kind (if not containing magnesia) will be perhaps the cheapest and safest manure for cotton soils. It should be well pulverised to produce the best effect. If the kunkur is very hard, heating the lumps in a fire, without calcining them to lime, and then suddenly quenching them in cold water will probably make them break easily to pieces.

4. For manures applied to the plant only, it is probable that besides those from the farm yard, wood ashes and char-

coal* of all kinds (excepting perhaps the ashes of soondry† and other woods near the sea, which may contain too much muriate, or carbonate of soda), decayed leaves, mud from ditches, &c. will be found the best, and, when procurable, oil-cake or fish refuse, both of which are I believe used in China for cotton soils? and even the cotton seed of the preceding crop after the oil has been pressed from it, or even if fermented to prevent its germination, will all be found advantageous. The cultivator should in a word recollect that nothing can be amiss which will furnish back to the soil the carbon, *i. e.* vegetable matter, of which the plant is constantly depriving it; and that, perhaps, he only requires a very little addition to his outlay and trouble, where he already has decent cotton, to make a very large one to his returns. He should not forget too that the mere growing of the cotton is but half his work; that it requires to be carefully classed and cleaned for market, sorted before it goes to the jennies, and *woated*, *i. e.* picked, to take out specks and yellow particles, which are produced by the oil of bruised seeds; all this will add far more to the price than the trouble of it costs, and the Indian cultivator may be assured that *cleanliness is as essential to cotton as to Indigo*.

The chemist and vegetable physiologist will see, in the first part of this paper, views which might have been further followed out; but, independant of the practical design and the length of the paper, I may state that it has been drawn up partly during illness, and under anxiety and distress of mind of no common description, and this has prevented me from making it as complete as I could wish. In a future essay I trust to be able to pursue my views farther.

* Charcoal. We take this in general to be insoluble, and so it is, but there seem to be cases in which it is highly beneficial to soils, and I think partially soluble. I have not had the leisure to go into the detail of my views but shall do so in a future paper.

† The ashes of the Sunderbund woods from Mr. Geo. Prinsep's salt works were found by my friend Dr. Hufnagle, to contain 25 per cent. muriate of soda, and only 3 per cent. carbonate of potass, with a little sulphate of potass: it is not however certain that these ashes were pure.

XXXIII.—*On the preparation of thread from the wild Pine Apple Plant.* By Miss DAVY.

[Read 16th January 1839.]

In consequence of an advertisement, that appeared in the papers, in the year 1837*, calling the public attention, to the preparation of thread from the Pine Apple leaf, which you expressed a wish, to make a staple article of commerce of the country, having resided in a district, in the country where the Pine Apple grows wild, I have been trying to prepare a thread, equal to the finest flax thread manufactured in Europe. I beg leave to submit some samples of my preparation, to be compared with the thread of the finest Cambric, made in France. I have no means of carrying the experiment further. The thread so prepared, cannot be spun, in the way of flax, wool, or cotton, from the length of the staple, but must be joined and twisted together in the same way as silk is treated, when wound off from the cocoons. The thread, in its coarsest state, might be made into a cloth, equal in strength and durability to a fabric, resembling Russia Duck, and would make beautiful table linen; when prepared, as fine as the specimens I now submit to your inspection, it would be equal to the finest cambric, and make a lace resembling blond†.

XXXIV.—*Information respecting the best mode adopted in the West Indies for the culture of Ginger.*

[Read 16th January, 1839.]

“The accompanying extract of a letter from the West Indies (Jamaica) to my address, and from an experienced gentleman there, may perhaps be of interest to the Society

* Vide Transactions of the Society, Vol. iii. pp. 83, 123.

† Miss Davy's specimens have been transmitted to the Committee of Agriculture and Commerce of the Royal Asiatic Society of Great Britain and Ireland to ascertain the commercial value of the article.—H. H. S.

in respect to the cultivation of *Ginger* here, and I send it to you in that hope.

Should I receive any of the roots referred to I will send you a supply.

(Signed) J. COWELL.

Calcutta, 5th Nov. 1838.

Extract of a letter from Jamaica, dated 23rd June, 1838.

“ You ask me to send you some *Ginger seed*, it is propagated here like potatoes from the roots ; it is planted in deep furrows made for the purpose and as it grows up, it is weeded and moulded up ; it requires a rich and light soil where the roots can expand, it is precisely the same as the E. I. *Ginger*, the only difference is in the cultivation and manufacture. To make what is termed *white* *Ginger*, it must be gathered before the root becomes *fibrous*, which is in the months of June and July. When gathered, the roots are washed to clear it of the soil. It is then handscraped by knives, so as to leave no particle of skin or rind ; it is then washed, and laid out on sheets or terraces to dry, which is generally effected by 8 or 10 days’ sun. To make what is called *black* *ginger*, the roots, when gathered, are washed clear of the soil, then immersed in hot water to kill vegetation, and afterwards laid out to dry. This last process is short and unexpensive, but as this kind does not bring a remunerating price, none is now manufactured. I am quite sure that E. I. *Ginger* is not inferior to that of *Jamaica* if properly manufactured. I fear any roots sent from this to *India*, would not keep good for planting after so long a voyage, but I will inquire, and if found practicable, I will send you some when in proper season, *viâ* *Egypt*.”

XXXV.—*Intelligence concerning the progress of Agriculture and Horticulture on the table land of Southern India, conveyed in the form of a Report from the Agri-Horticultural Society at Bangalore.*

[Read 16th January, 1839.]

Although more than a year has elapsed since the last General Meeting of the Society, the delay has not been caused by any unwillingness to report progress, as it is with great pleasure that I can now state that the Society has progressed more successfully than could have been anticipated. The numbers and names of subscribers must of course vary much in a station which is so purely a military one as this is. Since the establishment of the Society there have been 280 members, and at present there are 147, classed as follows:—

Mysore Commission, 13	18th N. I.....	9
Clergy and Staff, .. 22	32nd N. I.....	7
13th Lt. Dragoons, 17	34th N. I.....	4
Artillery,..... 5	38th N. I.....	3
H. M. 39th Regt.,.. 33	Merchants,.....	4
Natives, 2	Non-residents,..	17

By one of the rules a member ceases to be liable for subscriptions on his leaving the Mysore division; this of course is tantamount in most cases to a withdrawal from the Society on account of being beyond its range; exclusive of these, there have been only 7 withdrawals, and out of these not one I believe on account of being dissatisfied with the Society and its managements.

I am not aware of a single permanently resident officer who is not a member of the Society, and as the number of subscribing members is rather lower than usual it must be attributed to the circumstance of the newly arrived regiments not having taken any interest in the Society. Non-residents have been very liberal in assisting the Society in various ways, as will be seen by the statement of donations and presentations attached to this Report. The sums received

during the last year, as will be seen by the statement of the receipts and disbursements, is Rupees, 5,190 2 10, and the expenditure, Rupees, 4,379 7 6.

The garden establishment is very nearly the same as it was at the last meeting, and the principal heavy expenses, have been caused by building a seed-house and dwelling-house, for the European Superintendent, constructing Hotbeds, building-walls, and the payment of prizes awarded at the various exhibitions.

The latter is a great draw upon the Funds; but the exhibitions have been attended with so much good, and will if continued effect so much more that it is quite evident, the money could not be better laid out.

In the Agricultural department, the cultivation of the American Cotton has been carried on to a considerable extent and with great success. All the varieties seem to thrive, and the produce of all has been very satisfactory. A great quantity of seed raised in the garden has been distributed, and there is still a large quantity for distribution. The natives seeing the Cotton grow, and perceiving the quality and quantity of the produce, are anxious to try it, and the soil of the greater part of Mysore seems very well adapted to the Upland Georgia, and many localities, particularly in the Nugger country, for the Sea Island, which has proved very healthy and productive in the garden.

The Egyptian Cotton has grown very well, but the seed which was sent to us by the Horticultural Society of India, is evidently mixed, and I cannot distinguish the difference between some part of it and the Bourbon.

The light brown soil of moderate depth and rather sandy, (so prevalent in Mysore,) seems to be the soil that suits the Upland Georgia and New Orleans; but the Sea Island thrives in moist ground that is well drained. The experiments prove, that the produce is much greater from those shrubs that have been transplanted. None of the varieties seems to require any particular care after the first raising, and they were in bearing for 10 consecutive months without

any apparent deterioration taking place in the quality of the Cotton, till they were recently cut down in order to induce them to produce fresh shoots. The Upland Georgia undoubtedly ought to be widely distributed ; it must prove a lucrative crop. The wool of the Bourbon Cotton is very liable to the attacks of an insect which has proved very difficult to destroy.

I have also found the Egyptian, to suffer much from the same insect, which seems to be a further proof of their close affinity. The American varieties do not seem to suffer so much from its attacks. The Nankeen Cotton received from Mr. Alexander has not yet fruited. Mr. Blane was kind enough to send us some Mauritius sugar-cane which, instead of being distributed, was cultivated in the garden, and has thriven remarkably well, and is the admiration of all the natives who see it. It has been planted in holes and experiments have been tried with various manures which already prove that sheep's dung is by far the best.

The manufacture of Vinegar from the juice of the cane is likely to be a great source of profit ; from 2 maunds of expressed juice, 30 bottles of vinegar have been obtained, fully equal to any English vinegar in this country, and if this was sold at half the price of English vinegar, namely, 8 annas a quart, it could produce 15 rupees from two maunds of sugar, worth at the best price 1 rupee 12 annas, at 14 annas a maund.

The coffee has succeeded admirably, and contrasting the plants that have been exposed to the sun and those that were put in shady places, it becomes evident that exposure is beneficial to the coffee in Mysore. Many of the trees, although only three years' old, have produced $\frac{3}{4}$ of a maund of coffee. I think that coffee is the most profitable plant that can be cultivated in Mysore. A great part of the country is peculiarly favorable to it.

The whole of Nugger, and particularly the Bubabooden Hills, upon which a considerable quantity of coffee is already grown ; the whole of Coorg, and many other isolated spots

in Mysore are thoroughly adapted to its favourable growth. The principal objection of the natives to it is, that it requires some years to come to perfection. A considerable quantity of oats were grown in the garden the last year : the produce has been great and of a very superior description. Wheat of various kinds have been cultivated and distributed to a certain extent amongst the natives. A small quantity of barley was grown, and I feel confident that it would be by no means difficult to maturatize it in Bangalore.

The hops that were received from Captain McCally, on the part of Government, are very healthy ; they have been planted out and every endeavour will be made to introduce so valuable a plant. The moderate climate of Bangalore is, in my opinion, better adapted to the hop, than the extremely variable one of the Nilgherries.

During the last month, a plough made after an American model, was received from the Madras Society, which is of a very bad description ; I had a coulter put into it and the beam shortened, and have contrived to make it work pretty well, although there is still a very great fault which will soon be remedied, namely, the share being made of cast instead of wrought iron, which renders it impossible to set it right when once a little out of order, and would entail a new share for nearly every day. Two bullocks draw it in dry unworked ground, and the natives seem greatly pleased with it. It will prove a very valuable implement to them, and is by no means heavy for an able-bodied man, and the work that is done with it is of real service to the ground, in addition to the economy of time, which is very valuable at the season when the ploughs are required ; for although labourers are in general plentiful in Mysore, every hand is required at one time to get the ground ready as soon as the rain commences. The notion that the soil is not deep enough is a very fallacious one ; there is a very small part of Mysore that would not bear the very deepest ploughing and moreover derive great advantages from it ; of course the upper surface is more pulverized and apparently of a better description than

that immediately below it, which however would bear much better crops. Indeed the fact of their digging the ground deep once in every 3 or 4 years is a convincing proof that they themselves are aware of the necessity of bringing fresh soil into use. Several natives have been taught by a European how to manage the plough and have already made great progress with it.

In Coorg there is a great space of excellent ground left uncultivated for want of hands; there the plough would be invaluable and the valleys might be made to produce coffee, barley, &c. The Burgers on the Neilgherries are remarkably neat and clean farmers, but they seldom cultivate the same ground two years running—for this reason, that they exhaust the soil the first crop and their ploughs do not go deep enough to bring good soil to the surface. Horses or rather mares might be used in the ploughs with great advantage; they are more manageable than bullocks, and their foals would be of value to the farmers, and the expense of keeping them at a short distance from large stations would be very trifling. The horses would also give them a greater interest in their farms than they at present are capable of.

Draining would be of much service in a great part of this country where the soil is rich and naturally very productive, but so cold from the retention of water that it is but little adapted to most crops. During the dry weather there are so many hands to spare that draining might be carried on whenever required; it does not however bring profit sufficiently immediate and evident to induce the natives to adopt it.

Some Cape Clover Seed was received from Mr. Popham, but none of it vegetated, and I very much doubt from the specimens of clover already in Bangalore whether it would ever be worth cultivating in comparison with Lucern which thrives here so admirably.

The Tea plants received from Mr. Sullivan are healthy, but do not grow rapidly. I intend shortly to graft some of them upon the *Gordinia Obtusa*, of which there are two plants in the garden, in hopes of rendering it more hardy.

The progress hitherto is sufficiently encouraging to induce further experiments which I have no doubt would ultimately prove successful both on the Neilgherries and in Bangalore.

I saw one plant on the Neilgherries at Katie in full flower and in excellent health, thriving as well as a plant could thrive. I believe there are not alive, six plants of the set with which this one came, and which originally consisted of many hundreds : this was however the effect of bad management.

In the Horticultural Department great care has been given to obtain good seed from the finer kinds of vegetables, such as, knolkole, cabbage, radish, celery, &c. The endeavours have been successful with the radish only. The rhubarb has grown rapidly and been increased. The seeds of the Gigantic cabbage which were sent to us from several quarters all failed ; every endeavour to make them vegetate was useless.

A great improvement has been effected in the pea, already very good here, by introducing the Dwarf Prussian and Knight's Green Marrow both of which are very hardy and will I hope, soon be generally cultivated.

Some potatoe seed raised on the Neilgherries and presented to the Society by the Honorable Mr. Sullivan failed. The Scotch red apple, and New South Wales potatoes have both been propagated.

In the fruit department the principal care has been to teach the Native gardeners how to prune. No new fruits or varieties have been introduced, but the good ones have been increased. That the apple is deserving of cultivation in a lucrative point of view, is evident from the fact mentioned at a former meeting of Sergeant Masters having realized in nine months by apples upwards of 700 rupees from a garden that is not a beegah in extent.

The pine apple has been also improved and several excellent kinds of oranges are now cultivated in the neighbourhood. A catalogue of the different varieties of fruit descriptive of their relative properties and value has been com-

menced, but will still require some time to complete satisfactorily. Some seed of the Nagpore guava was received a long time ago from Captain Pooley ; the seed remained in the ground for several months without vegetation, but did so at last and the plants are now growing rapidly. I tried during the last year some curious experiments with mercury, many of the apple trees were infested with a black disease which destroyed the trees rapidly. I bored holes through the wood as far as the pith and filled them with mercury—in no single instance did it fail to stop the disease.

Grafting trees of one genus upon those of another genus has been done to some extent by way of experiment, not that I think much good is likely to be effected by it. I have grafted the apple upon the locquart, the orange upon the pomegranate, the rose apple upon the Avocado Pear, and the Jamlosa Malacchisis upon the locquart.

The strawberry is well deserving of care in Bangalore and repays the trouble bestowed upon it. I cannot, however, recommend Dr. Ingledeu's system after having given it a fair trial. Exposure is undoubtedly beneficial to it as may be seen by the bed of strawberries in the garden which have now been in bearing since January.

The Neilgherry gooseberry is thriving but has not produced any fruit. A great number of trees and plants have been introduced, during the last year upwards of 200 species. A catalogue of all the plants in the garden has been completed and will be printed. Amongst other plants it may be worth while to mention the *Rhododendrum Arborecum*, *Daphnæ Ericæphala* and the *Berberis Leschenanthi*; this last plant is, I believe, never found on the Neilgherries at a lower elevation than 6,200 feet, and yet it is thriving admirably in the garden. The tree *Fyern*, a species of *Lyathea*, is also growing well, and the two fir trees have advanced as rapidly as they would have done in England. These all prove the advantages of the climate in Bangalore which are not, I imagine, surpassed in any part of the world ; with the use of a green-house, which I hope we shall be able to build in the

ensuing year, I think that any plant, no matter of what country it may be native, would succeed. It is infinitely better adapted for experiments than the Neilgherries; but when I speak of Bangalore, I do not confine it to Bangalore itself actually, as I think any place at a similar elevation in Mysore, and there are many, equally favourable. I have derived great benefit from the use of the hot bed, as I scarcely ever fail in raising seeds from England which in former times, seldom if ever vegetated in greater proportion than one in twenty. Experiments have been made in boiling seeds and have proved advantageous in causing them to vegetate much quicker than when left to themselves: some I have boiled fifteen minutes. I should generally recommend that the water should be boiled, then taken off the fire and the seeds put in and allowed to remain for 10 minutes.

Experiments have also been made by a gentleman in Bangalore of putting bulbs into boiling water, which has caused them to grow much more rapidly than those treated otherwise. I have succeeded in growing many of the beautiful Orchideous plants, natives of moist forests, which have in general proved very difficult of cultivation, by a simple process of suspending a chatty above them, with a small hole pierced in it through which the water continually runs, and thus to a certain extent imitates their native situations. They are well deserving of cultivation. A considerable improvement has been effected in the flower pots, which after some trouble are now regularly made after the English shape and sizes, and are kept in the gardens, sized and marked to agree with books on English gardening.

The gardeners have been instructed in potting and repotting plants, the advantage of potsherds, the use of a hot bed and raising seedlings in it, the artificial impregnation of flowers in order to obtain new varieties, laying, and several new modes of grafting herbaceous and other plants. A number of boys frequently attend the gardens to learn their business, and who render some assistance without receiving pay. I had at one time a regular school in the garden, for

teaching the boys in classes, but unfortunately some person told them I was endeavouring to make them Christians and my intentions were defeated. I have adopted a plan of giving a number of tickets of admission to the garden to the Secretary to the Commissioners, to the Superintendent of the Bangalore division and some other influential gentlemen for the purpose of being given to any native who might wish to go into the garden for the purpose of seeing, gaining information or receiving seeds, which have been freely distributed whenever requested. The sums received during the last year evince great liberality towards the Society; the available balance of upwards of 900 rupees will, I hope, prove that the expenses have been kept within proper bounds. A large garden like the one belonging to the Society, which it is endeavoured to cultivate in the best manner possible, is a cause of very serious expence, but the regulations of the Committee that the seed and surplus produce of the garden should be sold, making a deduction of one-half in favour of subscribers, has been a material assistance to the funds, and moreover prevents all complaints about partiality in the distribution. A book is kept in the garden in which any member wishing for a particular plant, seeds, varieties of fruits, &c., writes his name and the article wished for, and is supplied with it as soon as it can be spared. All endeavours have been in vain to induce the head natives to take any lead in the Society; an infinity of good might be effected by them as being the proper persons to whom any of the natives could apply for seeds, plants, instructions, &c. From Ramasawmy Moodelliar, Janapar, Curta Curta, the Society received the munificent donation of 200 rupees, with a promise to assist the Society in every way in his power; but from no other native have we received even an offer of assistance, although a great number of the respectable class visit the gardens.

The appointment of some scientific and practical person as superintendant of agriculture in Mysore would be attended with excellent results. There can be no doubt that the

country is capable of producing the very best descriptions of cotton, tobacco, sugar, spice, and many other articles that invariably meet with a ready market, when of good quality. It must, however, at least be begun by the Government. A small portion of ground, in each talook might be placed under the superintendant to be cultivated on the part of Government, which I have no doubt would much more than cover its expence ; as, for instance, country cotton seldom produces 30 lbs. an acre of clean cotton, whereas the Bourbon has been known to produce 270 lbs. and upwards : here is a clear gain of 900 per cent., in addition to the vast difference in the prices. For 1837, the best Indian cotton only brought 8*d.* a lb. and Sea Island 2*s.* 6*d.* ; it is scarcely possible to fancy a greater difference of price in any article in the same market. The Mysoreans are good farmers and after starting a few difficulties are willing enough, particularly when recommended or ordered by Government, to adopt a plan that is evidently profitable. It is, however, perfectly useless to attempt to argue with them in order to prove the likely success of any new undertaking. Proving the advantages of American cottons has been done in Bangalore by the Society, and ought to be sufficient for the natives in the neighbourhood, and has been I believe, an inducement to many to cultivate it ; and I am given to understand that many intend to adopt the mode of planting the sugar-cane which has been adopted in the garden and are anxious to obtain the Mauritius variety. The advantages of the garden are, however, comparatively confined, and although by a series of experiments in ameliorating fruits, grain, &c., it will be of universal advantage, yet these experiments ought to be carried on under the superintendance of one person who would require to be permanently appointed to the charge of the garden, to whom might be entrusted the care of the agriculture of Mysore. There is now no Botanical Garden in this presidency, and I feel convinced that Government could not fix upon a more eligible spot than this is.

The Horticultural Society of India, of Western India, and Madras have always afforded us every assistance in their power.

The Society of Western India, were kind enough to send us some copies of Dr. Mutti's pamphlet on silk in English and Mahratta. The latter was sent to the chief Commissioner who intends having it translated into Cannarees and circulated all over Mysore.

The natives would, I believe, take readily to the cultivation of the silk; the only steps the Society have as yet taken, have been to propagate all the different kinds of mulberry of which there are four distinct varieties in the garden.

The Society is indebted to the Editors of Newspapers at Madras for the kindness with which they have invariably inserted any thing connected with the Society when requested to do so.

WILLIAM MUNRO,
Secretary.

XXXVI.—*On the capabilities of the soil of Beerbhoom and its Materia Medica.* By JAMES ANDERSON, M. D. Civil Surgeon at Beerbhoom.

The principal vegetable productions of this part of Beerbhoom are rice, sugar, indigo, and cotton. The sugar is obtained from the common Bengali sugar-cane, (*Saccharum Officinarum*), for which the substitution of the Otaheite or even the China-cane (*Saccharum Sinensis*), would be a considerable advantage. The cotton is the product of the common cotton bush of India (*Gossipium Herbaceum*), the seed of which is sown with mustard-seed, in this month, (October) on the best paddy ground, enriched with manure, yet the cotton is of a very inferior description. I expect that the Upland Georgia cotton will thrive well in inferior lands, and speedily banish the other. Besides these, coffee grows in our gardens and yields a good berry; and tobacco, gram, the teel, sursee and teese oil plants; sunn, paun,

turmeric, arrow root of a very inferior description, ginger, red pepper, onions, dâl, &c. &c. are cultivated by the natives. Bujra seed, (*Panicum Spicatum*,) Shama, and Indian corn or Bhoota are articles of diet with the Sauntals, a hill people in this district. In the jungles are the Catechu tree, (*Acacia Catechu*,) the Lode tree, the bark of which is used for dyeing, the Ebony tree, the Sautsar tree, and the Toon tree (*Cedrela Toona*).

The Teek tree thrives pretty well at the station, also Doob grass (*Panicum Dactylon*), Henna (*Lawsonia Inermis*) and Guinea grass.

As it is to be expected that many natives, qualified to practise the medical art, will in a short time be sent forth from the New Medical College, who, it is to be hoped, will obtain a livelihood, by their profession, in various parts of India, it becomes an important subject to place within their means, the ability of procuring the most important articles of the *Materia Medica* or good substitutes for them. I am of opinion that much of this object may be effected by the Agricultural Society, and its Branches, which latter I hope to see ere long springing up in every station of our vast Indian possessions, disseminating the blessings of superior articles of diet and medicine to all around them. I would propose that the Society address the Company's Medical officers and others interested in the subject and request them to collect all the medicinal plants in their vicinity, which are peculiar to the district in which they reside and to send them to the Agricultural Society's garden, and all the Branch Gardens that have a similar climate and soil, from which the medical practitioners could be supplied at a cheap rate.

The following medicinal plants grow in the neighbourhood of Soory, and can be supplied to the Branch Gardens, if required.

The Catechu Tree.—The extract from which is one of our most valuable astringents. It is employed with the best effects in dysentery, diarrhœa, and in hæmorrhages, &c.

Cassia Fistula or *Purging Cassia*.—The pulp of the pods is an excellent gentle laxative, adapted for children and very delicate women.

Strychnos Nux Vomica.—A stimulant, narcotic and tonic: much used in paralysis.

Senna Obtusa.—A substitute for Senna; a good and certain purgative.

Erythronium Indicum.—The Indian Squill. An excellent expectorant and diuretic. Employed in asthma and dyspnoea and in dropsies.

The Tamarind and East Indian Gum Trees.—Medicinal properties well known.

Anise and Carraway Plants—thrive well, and produce seed, in the cold weather.

Croton Tiglium—from the seeds of which Croton oil, a most powerful purgative, is expressed.

Gentiana Cherytta.—Grows on the hills. A well known and powerful tonic and febrifuge.

Convolvulus Turpethum—I have found growing abundantly in the paun gardens near Soory. It is a very good substitute for the much used purgative, Jalap.

Melia Azadirachta.—The Neem tree. The bark is bitter and astringent. It is a pretty good febrifuge. An alkaline principle similar to Quinine could, I think, be obtained from it.

Euphorbium.—Species not yet determined.

Anante Moul.—A substitute for Ipecacuanha as an emetic.

Ricinus Communis.—The Castor oil plant. Properties well known.

Ammonia Vesicatoria.—The bruised leaves produce a blister in half an hour.

Onithrophe Serrata.—Root astringent. In diarrhoeas, &c.

Asclepias Gigantea.—The powdered bark of the root was used by Twining in obstinate ulcers, chronic eruptions of the skin, and rheumatism with remarkable benefit.

Semecarpus Anacardium—or Marking Nut. The juice of

the nut mixed with oil makes a good stimulant liniment for rheumatism, &c.

Plumbago Zeylonica.—Root and leaves produce a blister.

Abrus Precatorius.—Wild Jamaica Liquorice Root. A good pleasant demulcent. The decoction of it in combination with other mucilaginous vegetables is useful in Catarrh, &c.

The greater part of these I discovered last cold weather in the immediate vicinity of Soory. A careful and extended search in other localities, on the varied face of this district, would, I have no doubt, add considerably to the catalogue.

Correspondence of the Beerbhoom Agricultural Society connected with the foregoing.

From Dr. ANDERSON the Secretary, to Mr. J. W. LAIDLAY of Gonitea.

“It would be superfluous to inform you of the necessity of a Branch Agricultural Society in this zillah, or of the many improvements which may be effected in the present system of agriculture in India by the introduction of the vegetable riches of other countries, and superior implements of husbandry. I may merely mention that the wonders that have been wrought in the fairy bowers of Horticulture in our native land, lead us to hope that ere long under the direction of British perseverance and industry, the most barren parts of Hindoostan will be brought into subjection to the plough and yield sugar, cotton and coffee, equal to any obtainable in European markets, and that the bazars will teem with productions, now only procurable from foreign countries, with great trouble and expense.”

“The capabilities of this zillah for the growth of many of the late important introductions from other lands, especially the American cottons and the Otaheite sugar, the extensive uncultivated wastes that chequer the face of the country and only require the industry of man to turn into sources of

wealth ; the high and dry nature of the soil, and the comparative industry and unsophistication of a large class of hill-people in this district whose principal employment is the reclamation of jungle-lands—all these hold out hopes that the labours of our Society will speedily be rewarded by extensive and permanent improvements in the state of Agriculture in this district.”

From Mr. LAIDLAY to Dr. ANDERSON.

“ Although tobacco does not form one of the exports of this zillah yet a considerable quantity is cultivated by individuals for their own consumption about Soory and in the north-western parts of this zillah. The plants from which I obtained leaves and flowers, were from 2 feet, to 2 feet 4 inches, in height, (half the height of the American tobacco) and the largest leaves are only 10 inches in length. I send you a specimen of the earth which I took from the roots, and which is composed almost entirely of red kunker, which you are aware contains a large quantity of peroxide of iron. Yet the natives assure me that the tobacco is very bad and bitter, and only used by the hill-people and the indigent part of the population who are unable to procure better. How far this may be owing to bad seed, I am unable at present to say, but I suspect something more is necessary for its successful cultivation, than the presence of the red oxide of iron, in the soil.”

“ The specimen of tobacco you have kindly sent is certainly very miserable, and the soil too, I should imagine, to be very bad, although if Mr. Piddington’s speculations were just, it contains iron enough to make the plant flourish prodigiously. With all due deference, however, I am not prepared to jump to his conclusions so readily. If we attend only to the iron contained, why *every* plant will be found to require a ferruginous soil, but tobacco contains a notable quantity of nitrate of potash and muriate of ammonia, (the latter a most rare ingredient in plants,) and these two salts are infinitely more likely to affect the flavour of the leaf than a

small portion of oxide of iron, an inert body. Now as neither of these can be supplied by the atmosphere, we must search for them in the soil, and accordingly I should imagine, that a compost similar to the *saltpetre beds* which Napoleon employed so extensively in France, would be a good manure for tobacco lands: namely, calcareous matter, such as old mortar, dung and the ashes of weeds or wood. That good tobacco may grow in Beerbhoom, I know, having raised some myself several years ago from American seed. The plants grew most vigorously and produced leaves about ten times the size of the specimen you sent. I may further observe, in confirmation of my opinion about the proper manure, that in other districts in which I have resided, the natives always grow their tobacco (each for his own use) upon the heap of rubbish at his door, consisting of ashes, cow-dung, and offal of all kinds. While the soil of the Gangetic diluvium almost always contains carbonate of lime, the Beerbhoom soil does not, as far at least as I have examined it."

The Cotton of the Sauntals.—"I take this opportunity of presenting you with a specimen of the *Nankin* cotton grown among the hills northwest of Beerbhoom. The staple is short but strong and the produce small, but I believe it thrives better in that dry soil than the common variety. It might be worth inquiry whether the industrious Chinese have been able at all to improve this variety."

To Mr. LAIDLAY, from Dr. ANDERSON.

"I was aware that cotton was cultivated by the Sauntals a hill tribe in the northwest of this district, but when I visited them last cold weather I was unable to procure any seed. The cotton you have kindly sent me has all the characters of the *Nankeen* cotton, which is, I believe, a variety of the *Gossypium Hirsatum*, with the exception of the red or tawny colour. It also perfectly agrees with the *China* cotton which is a variety of the *Gossypium Herbaceum*. The leaves of the former are *hairy* with 5 acute triangular lobes; those of

the latter are *hairless*, with sub-lanceolate, rather acute lobes. I shall sow the specimen you have sent in the Society's garden and would feel much obliged by your affording me a description of the plant from which you obtained it."

From Mr. LAIDLAY to the Secretary.

"The plant from which the specimen of cotton sent to you was obtained is very different from the ordinary kind grown about us, being a slender meagre stem, about 3 feet high, sending out few or no lateral branches, and having, as you describe, hairless leaves and long acute lobes. The fibre itself upon being scoured in the usual way acquires the red or tawny colour peculiar to the Nankeen cottons, although it is white before undergoing that operation. It grows in a soil too poor and arid for the common kind, and the produce is much smaller."

(The above is, in my opinion, the China cotton.—J. ANDERSON.)

Mr. LAIDLAY to Dr. ANDERSON.

The Agriculture of the Sauntals.—"As the chief dependence of the tribes inhabiting the jungles of Beerbhoom is Indian corn or Bhoota, probably it would be desirable if possible to procure a few seeds of Mr. Bell's superior and more-productive kind. Both the red and the white variety are cultivated among the hills and grow to a good size, producing however but one ear. The people grind it into meal and in the shape of porridge, it affords them a strong and hearty food."

Dr. ANDERSON to Mr. LAIDLAY.

"I shall do my utmost to direct the attention of the Society to the improvement of the Agriculture of the Sauntals, and shall in my next letter to the Secretary to the Agricultural Society of Calcutta, apply for seeds of the two varieties of Indian corn mentioned by you. The very original nature of their religion, manners and customs, their truth, simplicity and partiality for Englishmen induce me to believe, that the seeds not only of social but of mental improvement would

be eagerly received by them, and would meet with but few weeds to obstruct their luxuriant growth. I am surprised that no Missionary has ever taken the trouble to learn their language and devote himself to their spiritual improvement. He would find them much less bigotted than the Bengallees, and I am certain would soon produce the fruits of righteous-

Mr. LAIDLAY to Dr. ANDERSON.

“As you appear to take a lively interest in the welfare of the Sauntals, may I take the liberty of suggesting that inquiry may be made for seed of the Nepaul ‘Hill rice’ called I think, ‘*Joomlah.*’ The rice grown in the hills north-west of Beerbhoom rarely succeeds because of the scanty means of irrigation, and if I am not mistaken, the ‘Hill rice’ I allude to thrives, as its name almost implies, upon a very moderate allowance of water. These people are very simple it would appear in their habits, and I have heard the Bengalis frequently speak of their veracity with applause. Their language is of course very circumscribed, which I should imagine to be a considerable impediment to their instruction. The Editor of the *Reformer* newspaper, who was some time Dewan of this Filature and amused himself by making a vocabulary of their language, told me that it consisted of only a few hundred words.”

From Dr. ANDERSON, to Mr. LAIDLAY, with Upland Georgia, New Orleans, and Sea Island Cotton Seeds.

“I have prepared the seeds for sowing in 2 ways; 1st, That employed in Central India by mixing them with cowdung and exposing them in the sun till dry, and, 2ndly, in the Bengal manner by keeping them moist till they begin to vegetate. I have also sown them in the common soil of this part of the country, and in various composts, but as yet can perceive no difference in the size or strength of the young plants. How far the quantity and quality of the cotton may be influenced by these differences I am of course un-

able at present to say, but it should be remembered that the Calcutta Society assign 'too rich' and 'moist' a soil as one cause of the failure of the cotton crops at the Akra farm, the vigour of the plant being (say they) consumed by the rapid and luxuriant production of wood, leaf and flower.

XXXVII.—*Soil and Productions at Darjeling.* By Mr. G. T. F. SPEED.

[Read January 16, 1839.]

I beg leave to bring to the notice of the Society three different kinds of acorns from as many species of oak growing on the hills in and about Doorjelung; likewise two cobs of Indian corn from the same vicinity, being grown by the Lepchas of Ging'h on the N. E. of the station.

As I do not believe any thing is known of the produce of this part of the country, so interesting at this moment, I beg leave to make a few observations for the information of my fellow-members of the Society.

The soil consists of an upper stratum of rich black vegetable mould, varying from about one to six inches in depth, beneath which is a deep stratum of red ferruginous earth containing mica, and occasionally quartz apparently decomposed gneiss, the base of which is a micaceous gneiss, varied by an occasional mixture of quartz: on to the southward a little but very little porphyry.

I have every reason to believe that the soil and climate are suited to European fruit trees, &c.; the wild strawberry abounds, as does also the raspberry of two varieties, both well flavored. I succeeded in bringing down five plants, but for greater security, as they had suffered much by an accident on the journey, they have been left with my fellow-traveller Mr. Laidlay at Berhampore. I observed likewise a kind of wild damson and two species of crab-apple, one small and with a long stalk like the Siberian crab, and the other will be best described as a Ripston pippin in miniature. I had

brought down specimens of these but they became so dry and withered as to be useless.

Of timber trees there are three species of oak, and two of beech, with walnut and birch all of great sizes, beautifully straight and in much abundance.

The ferns and lichens are extremely beautiful and well worthy attention, and to the florist also a wide field is open in the neighbourhood, as I found a mixture of flowers well known in Europe, with some of the most beautiful of India; as for instance the violet, the cowslip, the hair bell, with the malpeggia, the hibiscus, both *purpurea*, *officinalis*, and *africanus*, and the *holmskaldia*, &c. &c.

Another object on which I should wish a little attention to be bestowed is tea. I found many varieties of the *camellia* and among the rest one which appeared to me as the real tea as far as my knowledge went, which is however only derived from the plants I have seen brought from China and one or two from Assam. Some of the more intelligent Lepchas however, who were with the Foujdar at Doorjellung when I was there, recognized it immediately on its being shewn them as tea; it is therefore perhaps worth attention from those who may travel in that quarter.

In the Sekim country too I observed a species of plough which appeared superior to those used in the plains as far as form is concerned; its use extends also through the northern part of Rungpore I am informed. It is of the form of a double triangle, hollowed out beneath, with a considerable elevation above the plane where the share ought to be (for the objection to its use is the want of a share), thus having the appearance and effect of a double mould board, and throwing a very tolerable furrow.

Calcutta, 9th January, 1839.

XXXVIII.—*Report on Floriculture and Agriculture in the valley of the Dhoon. By Lieutenant H. KIRKE.**Deyrah, Sept. 9th, 1838.*

I hope you will find that I have not been idle in doing what was required, as I have made an experimental garden in the hills, situated so that I can irrigate every inch of it, and have now a great variety of English flowers and vegetables growing in it, and I am now making one near Deyrah from which I hope to send the Society maunds of seeds next year. In the garden in the hills I have got about 2,000 seedling dahlias, from which I expect a great variety, and I have also raised thirty-three new ones from English seed, besides other flowers that I have not yet seen in India. I have succeeded in raising an immense number of parsnips, and I am in great hopes of getting the mangul wurzul to flower in spring.

I am happy to inform you that I have at last succeeded in growing some hops from seed sent me by Lord Auckland ; I have a number of plants, some of them an inch high, with five and six leaves. I have also succeeded in an experiment with the Otaheite cane, which will, I hope, cause its rapid increase. It is very simple and as follows. The moment the rains have fairly set in, take cuttings from the old rattoons and plant them in the usual way ; these spring up immediately and will bear five or six canes by December, fit for seed, the root once being established no danger from white ants is likely to occur. I first planted fifty slips in this way on the 15th June, and all except one are now like old plants. On the 30th of the same month, I tried 200, and all except 3 are growing famously. I have continued the experiment throughout the rains with equal success, and feel certain that if a person is possessed of one acre of cane he may easily have 100 acres under cultivation by the end of the year, the rattoons once established I imagine the plantation would last for 15 to 30 years if put at proper distances in the first instance. It is quite evident that the white ant which is

apparently the grand enemy, goes down deep into the earth when the rains commence, and that from the constant moisture, the young plant grows much more rapidly, than in February and March the regular planting season. Mr. Waghorn sent me about two cwt. of the best Egyptian cotton seed, which arrived in excellent order, and is now growing luxuriantly at the farm.

PROCEEDINGS
OF THE
AGRICULTURAL AND HORTICULTURAL SOCIETY
OF INDIA.

JANUARY 10, 1838.

Agricultural and Horticultural Society of India.

The Anniversary Meeting of this Society was held at the Town Hall,
this day at half past 9 o'clock.

Present.

N. Wallich, Esq., M. D., V. P., in the chair.

The Honourable Col. Rehling; Col. D. McLeod; Dr. Huffnagle;
Dr. A. R. Jackson; C. K. Robison, W. Storm, R. Watson, Esqrs.;
Honourable W. H. L. Melville; Capt. H. Carter; A. Beattie, M. A.
Bignell, F. P. Strong, A. C. Dunlop, W. K. Ewart, A. Harris, E.
Preston, R. Smith, W. Cracroft, and W. F. Gibbon, Esqrs.; Baboo
Cossinauth Bose; J. H. Stocqueler, D. B. Syers, G. A. Prinsep, D.
Hare, W. G. Rose, J. Fergusson, W. Speir, D. F. McLeod, N. Mackenzie,
D. McPherson, J. H. Haines, A. Porteous, John Jenkins, and John
Bell, Esqrs.

Visitors.—Messrs. Spry and Dearman.

The proceedings of the last Meeting were read and confirmed.

The following gentlemen, proposed at the last Meeting, were elected
Members of the Society, viz.

The Rev. F. Wybrow; Cowr Kristnath Roy Bahadoor, Rajah of Cos-

simbazar; C. Tucker, Esq., C. S; Thos. Palmer, H. C. Kemp, and E. W. Clarributt, Esqrs.; Lieut. J. R. Lumsden; Lieut. J. R. Abbott, and Captain F. Smallpage.

The following gentlemen were proposed as Members:

L. Saget, Esq. of Sicrigully, Bhaugulpore, proposed by H. Piddington, Esq. and seconded by the Secretary.

W. Vansittart, Esq. and Capt. F. W. Birch, proposed by F. P. Strong, Esq., and seconded by the Secretary.

Thomas Gibbon and James Casserat, Esqrs. proposed by W. F. Gibbon, Esq. and seconded by the Secretary.

J. H. Bridgman, Esq. proposed by H. Walters, Esq. and seconded by William Storm, Esq.

J. A. George, of Dum-dumali, and P. Sutherland, Esqrs. proposed by W. G. Rose, Esq. and seconded by William Storm, Esq.

R. S. Strickland, Esq. proposed by the Secretary, and seconded by William Storm, Esq.

H. H. Spry, Esq. (Assistant Surgeon,) proposed by Dr. Wallich, and seconded by the Hon. Col. Rehling.

Capt. W. N. Forbes, (Engineers,) proposed by C. K. Robison, Esq. and seconded by Dr. Wallich.

William Mackenzie, Esq. proposed by A. Beattie, Esq. and seconded by Dr. Jackson.

The Meeting then proceeded to the Annual election of office bearers, when all the officers of the past year were re-elected; the list therefore remains the same, which is as follows, viz.

PRESIDENT.—The Honourable Sir Edward Ryan.

VICE-PRESIDENTS.—Dr. Wallich; His Highness Nawaub Tohowerjung; C. K. Robison, Esq. and Rajah Radhakant Deb.

GENERAL COMMITTEE.—Dr. Strong; Joseph Willis and D. Hare, Esq.; Baboo Radhamadhub Banerjee; H. M. Low and William Storm, Esqrs.

SECRETARY AND COLLECTOR.—John Bell, Esq.

NATIVE SECRETARY.—Dewan Ramcomul Sen.

The lists of members appointed to Standing Committees (nine in number) remain unaltered, viz.

STANDING COMMITTEES.

Sugar.—N. Alexander, A. Colvin, Dwarkanath Tagore, D. Hare, G.

U. Adam, A. Muller, J. Allan, W. Storm, J. Dougal, J. W. Masters, and John Bell.

Cotton.—Jos. Willis, A. Colvin, Dr. Huffnagle, G. A. Prinsep, W. Speir, W. Storm, D. B. Syers, W. Earle, G. U. Adam, and John Bell.

Silk, Hemp and Flax.—W. Speir, Ramcomul Sen, Professor O'Shaughnessy, J. Willis, R. Watson, C. K. Robison, H. M. Low, D. W. H. Speed, G. T. F. Speed, W. Storm, and John Bell.

Coffee and Tobacco.—Dr. Storm, Dr. Wallich, H. Walters, G. A. Prinsep, Capt. Leach, D. W. H. Speed, H. M. Low, D. Hare, and John Bell.

Implements of Husbandry and Machinery.—Col. D. McLeod, E. Sterling, James Prinsep, W. Cracroft, Ramcomul Sen, C. K. Robison, H. Walters, Radhakant Deb, Dr. Huffnagle, D. Hare, and John Bell.

Caoutchouc and Oil Seeds.—Dr. Wallich, Professor O'Shaughnessy, Ramcomul Sen, W. Speir, Radhakant Deb, J. P. Marcus, Dr. Corbyu, and John Bell.

Improvement of Cattle.—Dr. Wallich, H. Walters, N. Alexander, C. K. Robison, Dr. Huffnagle, W. Storm, W. P. Grant, G. A. Prinsep, W. F. Gibbon, Dr. Jackson, and John Bell.

Committee of Papers.—Dr. Wallich, W. Cracroft, W. Storm, W. K. Ewart, M. A. Bignell and John Bell.

Nursery Committee.—Dr. Wallich, W. Storm, Dr. Huffnagle, W. F. Gibbon, Capt. Leach, and John Bell.

The Secretary read the Annual Report of the Society including that of the Collector, for the past year, which exhibited very satisfactory evidence of the increasing interest to the objects of the Institution, both as regards its financial resources, and numerical strength. During the past year 148 names had been added to the list of Members, and only three retirements had occurred, two of those being gentlemen leaving Calcutta, and the other, having no time to attend to its proceedings.

Proposed by Mr. Cracroft, seconded by Dr. Wallich, and

Resolved,—That the Reports just read be adopted.

Proposed by Dr. Wallich, seconded by Mr. G. A. Prinsep, that the thanks of the Society be given to Mr. Bell for drawing up these Reports.

The Vice President next called attention to the annual exhibition of vegetables, and anniversary dinner, and proposed that the same course be adopted on this, as on the former occasion, viz. that the *time* and de-

tails regarding the exhibition of vegetables and the dinner be left to the Committee of Management. This proposition was adopted by the Meeting.

Read the report of the Caoutchouc Committee on the motion made by Mr. Cracroft at the last Meeting. The Committee recommend that the gold medal be awarded to Lieutenant Vetch on the condition being complied with, as embodied in the proposition.

Resolved,—That the Report be adopted.

Read the report of the Committee on Implements of Husbandry and Machinery, on the motion made by Mr. Bell at last Meeting.

The Committee report that, a machine after Mr. Teignmouth Sandys's model, could not be erected at a less cost than one thousand rupees, and that it is not expedient to incur this cost, with reference to the advantage it might possess over machines of similar construction, &c.

Resolved,—That the Committee's Report be adopted.

Read the Reports of the Nursery Committee, made up since the last Meeting, showing an increased cultivation of sugar-cane, and resolutions upon which the cotton beds, &c. are to be made subservient to more supplies of cane expected from Jubbulpore and Bourbon.

Resolved,—That the Committee's Reports be confirmed.

The motion made by Mr. Storm at the last Meeting—"That an application be made to the Admiral Commanding in India, requesting him to give instructions to any of Her Majesty's ships of war touching at Otaheite, to bring such quantity of the cane of that Island as they may be able conveniently to carry for the use of this Society," had been carried into effect by the Secretary addressing a letter to that authority.

Notice of Motion.

Proposed by A. Beattie, Esq.—"That with a view to the improvement of sugar cultivation in Bengal, this Society having employed all the means in their power to obtain a sufficient supply of a better description of cane than is indigenous in this country; and there being only a limited quantity now in their possession, and but slender prospects of an early accomplishment of this desirable object, on a sufficiently extensive scale without aid from some other quarter,

That the Secretary be requested to address the Government on the subject, and solicit His Honor the President in Council to consider whether for an object fraught with such extensive benefit, and of such

PROCEEDINGS OF THE SOCIETY.

general utility the Government could employ at an early period one of their own vessels in bringing up a supply of seed cane from Otaheite. This Society would undertake to distribute it in the most prudent manner, to secure the best possible result from the same, in the sugar cultivation throughout this Presidency."

The following communications were read. From Dr. R. Wight of Madras, dated December 21st, transmitting 110 more copies of plates of dye-Lichens to complete the number required for the Transactions, viz. 500, forwarding copy of a correspondence with the Madras Government on the subject of Lichens, and regretting his inability to furnish more information at present regarding them, but promising to do so, when in his power to procure it.

The Vice President here called the attention of the Meeting to the subject of certain observations made by the Secretary in his precis of the Meeting of the 8th November, 1837, in a letter from Dr. Wight of Madras to Dr. Wallich, which was read on that occasion, and stated that from letters that had since passed, which he thought it unnecessary to bring forward, he was sorry to say, had given offence to Dr. Wight.

The Vice President then read the extracts and observations in question; after hearing which the meeting was of opinion, that nothing of an offensive nature, appeared in the Secretary's remarks.

The Secretary, however, observed, that as the remarks made in Dr. Wight's communication in the precis of the 8th November Meeting, were his own, and not those of the Society, he begged to "propose that a minute be made in the Proceedings to the effect that the paragraph which appeared in the precis of a meeting of the 8th November might be cancelled," which was assented to.

From Dr. Wallich, dated December 19th, presenting on the part of Mr. C. Manley, a small quantity of nankin cotton seed.

From Capt. Sanders, Secretary to the Military Board, dated December 15th in reply to the Secretary's letter of the 8th instant, on the subject of guinea grass, returns the Society the thanks of the Board, for the information therein contained.

From Capt. A. Bogle, dated Kyouk Phoo, December 3d, advising the despatch by the *Krishna* of a parcel containing samples of Arracan rice, together with a list and prices of the same during the past and present year, and conveying information regarding this the most important staple product of the Province.

Stating that he has also forwarded by the same vessel, three bottles of genuine Sandoway tobacco seed and sugar-cane cut in the Island of Ramree, as samples of the cane of Arracan, which seem to be superior to the common cane of Bengal. Asking for a supply of seed paddy, cotton seed, and Otaheite cane. Mentions his endeavours to discover beds of coal, and iron ore, which are known to exist on that Coast, and requesting information on the subject of Caoutchouc.

From Dr. W. G. Maxwell, dated December —, forwarding for presentation to the Society two large sized coloured drawings, from nature, of two species of tobacco plant, natives of the Northern Circars.

From R. W. Chew, Esq. dated December 18th, forwarding a branch of juneree, the produce of his garden.

From the Rev. T. Boaz, dated December 21st, forwarding on the part of Capt. A. Bogle, the several articles alluded to in that gentleman's letter, viz. 3 bottles Sandoway tobacco seed, 3 sugar-canes and a packet containing samples of rice.

From Dr. Wallich, dated December 21st, annexing extract of a letter to his address from Mr. Richards of the Royal Botanic Garden of St. Denis at Bourbon, under date 26th October last, in which that gentleman promises to transmit very shortly a box of cactus with "cocheuille fin" and 25 cases of Batavian sugar-cane.

From Lieut. H. Bigge, Secretary to the Agricultural Society of Assam, dated September 16th, announcing the formation of a Branch Society at Gowhatti, on the 15th September, under the title of "*The Assam Agricultural and Horticultural Society*," and soliciting the aid and advice of the Parent Society, towards furthering the objects of his association.

N. B.—The cause assigned in the precis of last month's proceedings, for the delay in acknowledging the receipt of a communication from R. Montgomery, Esq. of Azimghur, is equally applicable to the above letter.

From Major Sleeman, dated "on the Ganges," December 14th, stating that in accordance with the request conveyed in the Secretary's last letter, he has asked Lieut Brown to transmit, on account of the Society's Nursery, a good supply of cane from his Jubbulpore station, and that the same may be expected to reach the Presidency in the early part of February next.

Conveying, in reply to Queries, some information respecting the Ota-

heite cane, and mentioning the circumstance, that at Deyrah, a solution of the cedar-oil in water, has been found an effectual preventive to the attack of white ants on this species of cane.

From Lieut. Charles Brown, dated Jubbulpore, December 7th, intimating his intention of forwarding to the care of R. Lowther, Esq. of Allahabad, two hackery loads of Otaheite sugar-cane from Major Sleeman's plantation.

Stating that he has advised Mr. Lowther of this intended despatch, and has requested that gentleman to transmit the canes to the Society by the first steamer leaving Allahabad. Mentioning that if required, he can send down a further supply next month.

From Dr. H. H. Spry to Dr. Wallich, dated December 17, presenting a small supply of sugar-cane procured from Car-Nicobar, where it grows in a wild state. Forwarding a few copies of the proceedings of the Agricultural Committee of the Royal Asiatic Society.

From Dr. Wallich to the Secretary, dated December 19, forwarding a letter to his address from Dr. H. H. Spry, and stating that the cane therein alluded to (11 in number) are in good condition, and have been planted out in the Society's Nursery.

From Lieutenant C. Burnett, dated Beur, November 29, advising despatch by dāk baughy of the following, viz. sample of a species of barley termed "celestial" cultivated in the vicinity of Beur; sample of maize grown from American seed forwarded by the Society some time ago, and sample of nankin Cotton, the produce of Captain Dixon's garden.

Annexing a memorandum regarding the cultivation of the cotton seed supposed to be American (of the produce of which a sample of cotton has been forwarded, to the care of Dr. M'Lean, who may be expected to reach Calcutta in January.

Alludes to the attempts made to introduce the Otaheite sugar-cane in that part of the country, in which they have been frustrated by the depredations of the white ant, and requesting advice, as to the best means of destroying them.

From R. Watson, Esq. dated December 26, enclosing a letter to his address from Mr. J. C. Warner, dated Guttaul, December 21, on the subject of a second unsuccessful attempt to wind off the silk from another supply of area cocoons transmitted by Captain Jenkins, and of which a small quantity had been forwarded to Mr. Watson. Suggests, that with reference to the latter part of Mr. Warner's note a supply of the eggs

of the area worm be sent to that gentleman, when a fairer experiment may be made on the cocoons produced by them.

Specimens of Bhaugulpore Tusser wound raw silk, from James Pintel, Esq. were forwarded by — Shaw, Esq. of which particulars will be given hereafter, as to the mode of reeling it off.

From D. F. McLeod, Esq. (no date) received December 29th, presenting specimens of Tusser raw silk from Seonec.

From Dr. Wallich, dated January 3d, reporting a trial made in the Society's Nursery of samples of Gulph cotton seed received from D. B. Syers, Esq.

From J. Pagan, Esq. C. Assistant Surgeon, Rungpore, dated 8th December, forwarding a specimen of cotton, grown near the foot of the hills by a race of people, called "Mace."

From D. B. Syers, Esq. forwarding samples of cotton seed alluded to in his letter of the 25th November last.

Memo.—This is the seed to which Dr. Wallich's report above noted, alludes.

From Dr. Cheek, Secretary to the Burdwan Society, dated December 29th, forwarding samples of Virginian tobacco, guinea grass, arrow root, and cheese punkin, the produce of the Branch Society's Garden.

From R. S. Homfray, Esq. dated Barripore, January 5th, presenting two samples of paddy grown by him near Barripore, one marked A, of a description termed "Peelsaugor," the other marked B, called "Hulleedzoorie," and giving an account of the manner of cultivating, and of the expense attending the same.

From G. Leyburn, Esq. dated January 8th, presenting some barley for seed.

From Dr. Huffnagle, dated January 9th, presenting in the name of A. Graham, Esq. of Dowlutgung, Kishnaghur, specimens of Indian Corn, the produce of several successive generations, raised from American seed received in 1834.

From Dr. F. P. Strong, dated January 10th, presenting a small supply of English rye grass seed and Dutch clover seed.

From D. W. H. Speed, Esq. dated January 10th, forwarding a stock of sugar-cane said to be Otaheite.

From Messrs. Vilmorin, Andrew and Co., dated Paris, April 28th, to the address of H. Piddington, Esq. advising despatch on account of this Society of a box containing an assortment of seeds, numerous as to variety, but in quantities so small, as hardly to be divisible.

The Secretary has also to acknowledge the following presentations.

A cob of maize received from Sir E. Ryan, length 10 inches, circumference $7\frac{1}{2}$ inches, and number of grains 1,060.

From the Royal Asiatic Society of Great Britain and Ireland, (received through Messrs. Thacker and Co.) its Journal, No. 7. .

Proceedings of the Committee of Agriculture and of Commerce 12 copies.

Also through the same channel, a copy of the address of the President of the Medico Botanical Society.

From the Madras Agricultural Society, (received through Dr. Wight) a copy of instructions for the cultivation of the Mauritius sugar-cane and notes on dye lichens.

From Government 3 copies of a pamphlet, containing remarks on the natural resources of the Tenasserim provinces, by Dr. J. W. Helfer.

The Honourable Mr. Melville proposes to open a communication with the Highland Society. They were anxious to obtain the productions particularly of the Himalay, as this gentleman had well ascertained; and he was sure they would supply in return any product, which may be desired.

The Secretary intimated that he had addressed the Highland Society, last year, and had forwarded a copy of this Society's Transactions, but he thought there was scarcely time yet to receive a reply. The meeting was unanimous in its anxiety to be placed in communication with that and all Societies of a similar nature, and Mr. Melville and Dr. Jackson, offered to co-operate in England and Scotland, towards effecting this object. The latter gentleman also offered to procure for this Society any books, or information, required from England.

The thanks of the Society were directed to be offered for the foregoing communications and presentations.

N. B. The Society give the foregoing precis of the various letters and papers submitted to them, with a view to their acknowledgement, and for the information of the public without professing to answer for the certainty of the facts, or the propriety of the reasonings therein contained, which must rest on the credit or judgment of the writers.

JOHN BELL, *Secretary*

Agricultural and Horticultural Society of India.

Town Hall, Calcutta, January 10th, 1838.

Proceedings of the Nursery Committee.

A meeting of this Committee took place at the residence of the Secretary, on the 20th December, 1837.

(Read 10th January, 1838.)

Present.

N. Wallich, Esq. M. D.

C. Huffnagle, Esq. M. D.

W. F. Gibbon, Esq.

John Bell, Esq.

The Committee had previously visited the Nursery, and found the Sugar-canes recently planted, coming up very regularly, notwithstanding the continued drought. Plot, No. 12, of Dr. Huffnagle's plan was holed ready for the reception of more cane; plot, No. 14, was being trenched.

Resolved,—That the ripe cane in plot, No. 1, be forthwith cut down, and planted out in No. 12.

Resolved,—That the ground now trenching be reserved for expected supplies.

Dr. Wallich read an extract of a letter, this day received from Monsieur Richard, Superintendent of the Botanic Garden, at Bourbon, dated 26th October, 1837, stating that he had prepared a case of Cactus, on which he intended to transport to this Society, the "*Gyana-fina*" insect, and promising to follow up this despatch by more, in the event of accident or failure.

Monsieur Richard also informs Dr. Wallich, that he had made ready 25 cases for the reception of Batavia cane, destined for the Society's Nursery.

Dr. Wallich informed the Committee, that he had a small plantation of the Cactus Cochinelifer, and in anticipation of this supply of insect had recently extended it very considerably.

In regard to the 25 cases of cane expected, it was *Resolved*, that they be immediately planted out on arrival.

The Secretary read a letter to his address, received from Lieut. Brown, in charge of Major Sleeman's cane plantation, at Jubbulpore, bearing date 7th December, intimating his intention, in reference to the Secretary's letter of the 24th February last, to despatch in a day or two, two hackery loads of cane for the Society, to the care of Mr. Lowther, at Allahabad, with a request that the latter gentleman would take the first opportunity of dispatching them by steam to Calcutta.

Read the Secretary's reply to Lieut. Brown, dated 18th December, thanking him for his attention to the wishes of the Society; and with reference to the latter para. of his letter, and anticipating the concurrence of the Committee and of the Society, (as Lieut. Brown required immediate notice,) soliciting a further supply of 10 hackery loads, which would make in all 12 loads.

Read a letter that day received from Major Sleeman, dated on the Ganges, December 14th, stating that he had instructed Lieut. Brown to give the Society a supply of cane, and promising to give further information on the question of Saccharine richness, compared with the juice of the country cane, when he should have time to follow up enquiry.

Resolved,—That as the Cotton beds had done their office, and with reference to the original design of the Society, with regard to the Nursery, the land now under Cotton cultivation be opened for cane cuttings when they arrive.

Resolved,—That the Secretary's application to Lieut. Brown, appears to the Committee judicious, and that it be confirmed.

Resolved,—That Major Sleeman is entitled to the best thanks of the Committee, in giving effect to the Society's wishes, as advised in his letter to the address of the Society, read this evening.

A meeting of the Committee took place at the residence of W. F. Gibbon, Esq. on the 5th January, 1838.

(Read 10th January, 1838)

Present.

N. Wallich, Esq. M. D.

C. Huffnagle, Esq. M. D.

W. F. Gibbon, Esq.

John Bell, Esq.

The Committee visited the Nursery, and found that with reference to a resolution passed on the 20th ultimo, the greater portion of the old stock of Sugar-cane of plot, No. 1, had been cut and planted out.

That the Sugar-canes received from Captain Bogle, of Arracan, through the Revd. Mr. Boaz, had not come up, and from their appearance could not be expected.

That plots 14 and 15 were mostly trenched, and partly dressed with lime.

That the West India Ginger Roots were now ready to be taken up.

Resolved,—That they be taken up, and kept carefully in sand, and that an advertisement be sent to the papers, with a view to collect the names of parties desirous of having a small supply, but that none be delivered, until after a month's date of the first advertisement, when intending cultivators shall be entitled to equal shares, reserving a small quantity to keep up a supply in the Nursery.

The Cotton Seed (Gulf) offered for sale by D. B. Syers, Esq. had partially vegetated in gumlals only,—that on the open ground had not sprung up.

Resolved,—That it does not appear to the Committee prudent to recommend a purchase of this seed.

(Signed)	N. WALLICH, M. D.	(Signed)	T. LEACH.
„	C. HUFFNAGLE, M. D.	„	W. STORM.
„	W. F. GIBBON.	„	JOHN BELL.

Agricultural and Horticultural Society of India.

A general meeting of this Society was held at the Town Hall, on Wednesday morning, the 14th of February, 1838, at half past 9 o'clock.

Present.

The Honourable Sir E. Ryan, President, in the chair.

The Hon. Col. Rehling, Dr. Wallich, Dr. Huffnagle, W. F. Gibbon, Esq., Dr. A. R. Jackson, F. T. Fergusson, Esq., W. Storm, Esq., R. Smith, Esq., A. Dobbs, Esq., M. Staunton, Esq., A. Harris, Esq., G. F. McClintock, Esq., Dr. D. Stewart, R. Watson, Esq., M. A. Bignell, Esq., and John Bell, Esq.

The proceedings of last meeting were read and confirmed.

The following gentlemen, proposed at the last meeting, were duly elected members of the Society, viz.

L. Saget, Esq., W. Vansittart, Esq., Thomas Gibbon, Esq., James Casserat, Esq., J. H. Bridgman, Esq., J. A. Gregg, Esq., P. Sutherland, Esq., R. S. Strickland, Esq., H. H. Spry, Esq., M. D., Captain W. N. Forbes, W. Mackenzie, Esq., and Captain F. W. Birch.

The following gentlemen were proposed as members:—

W. Moran, Esq., of Tirhoot, Thomas Parker, Esq., of Kishnaghur, and J. H. Savi, Esq., of Kishnaghur, proposed by C. DeVerinne, Esq., and seconded by the Secretary.

The Rev. C. E. Driberg, proposed by Dr. Wallich, and seconded by the Secretary.

Thomas Bracken, Esq., and Charles Oman, Esq., of Jessore, proposed by Samuel Smith, Esq., and seconded by the Secretary.

J. Lewis, Esq., C. S., proposed by Sir E. Ryan, and seconded by the Secretary.

J. B. Elliot, Esq., C. S., proposed by W. Cracroft, Esq., and seconded by Dr. Wallich.

R. Scott Thomson, Esq., and Captain H. J. Wood, proposed by the Secretary, and seconded by Dr. Wallich.

W. Rushton, Esq., proposed by Dr. Huffnagle, and seconded by W. Storm, Esq.

T. P. Morrell, Esq., proposed by W. Storm, Esq., and seconded by W. G. Rose, Esq.

Motions disposed of.

The notice of motion submitted at the last general meeting, proposing to solicit government to send one of their own vessels to Otaheite for the purpose of bringing a supply of Sugar-cane, was brought forward and discussed.

Moved by Dr. Wallich, seconded by Mr. Storm, and *Resolved*, That it is not desirable to adopt the measure proposed by Mr. Beattie, sufficient means having been already adopted to obtain supplies of Sugar-cane.

Notice of Motion.

1st.—Proposed by the Agricultural Committee, (in their report of the 8th February, 1838.) That with reference to the particular interest which Dr. Montgomerie, of Singapore, has taken in the proceedings of this Society, by sending from time to time, supplies of Sugar-cane from that island, the Society's gold medal be awarded to Dr. Montgomerie.

2nd.—Moved by Sir Edward Ryan, that the expense of publishing a pamphlet on the subject of Cochineal, prepared by Mr. Bell, be defrayed by the Society.

3rd.—Moved by Dr. Wallich, that with reference to a letter from Lieut. Kirke, of Deyrah, a small sum be allotted for the purpose of enabling Lieut. Kirke, to supply the Society with seeds raised in that neighbourhood, which are said to be equal to English seed.

Read the following communications:—

From Monsieur Richard, Superintendant of the Botanic Garden, at Bourbon, to Dr. Wallich, dated November 9th, 1837, intimating that under directions from the Bourbon Government, he had despatched by the *Alcide*, two cases of Cactus, covered with the Cochineal insect.

From Captain Charlton to Dr. Wallich, dated 23rd January, 1838, stating his intention of forwarding a quantity of the Cochineal insect, in a living state, brought by him from the Cape of Good Hope, on the ship '*Sesostris*.'

The President drew the particular attention of the meeting to these communications, which had given rise to a difference of opinion as to any of the insects being the true Mexican Cochineal, or '*Grana-fina*.' The insects from Bourbon and the Cape had arrived in a very satisfactory and healthy state, and had been seen by Mr. G. A. Prinsep, at the Botanic Garden, on their arrival; who pronounced them to be all the wild variety, called in commerce '*Grana-sylvestra*.'

Mr. Bell had subsequently inspected the insects, and pronounced those from Bourbon to be the true '*Grana-fina*,' and those from the Cape to be the '*Grana-sylvestra*,' and as it was considered advisable to have the insects examined by a Committee, before this time, he (the President) would read a report drawn up and unanimously adopted by that Committee, which, however, did not decide the question at issue, as none of the members had seen the living insect before, and their deductions were drawn only from the remarkable features which characterizes the two varieties. The insects were exhibited at the meeting.

On the report being read, Dr. Duncan Stewart proposed, seconded by A. Dobbs, Esq. and *Resolved*, that it be confirmed, as the report of the Society.

Moved by the President, and *Resolved*, that the Committee's report be published for general information.

Read a letter from John Guilding, Esq. dated Baranagore, January 12th; giving it as his opinion, that the Bourbon insect is the true *Grana-fina* of Mexico.

Read a letter from Charles DeVerinne, Esq. dated the 12th January; stating that the Bourbon insect is different from any living Cochineal he has seen in India.

The President mentioned, that Mr. Bell had collected some information in elucidation of the question at issue, which he had thrown into a pamphlet, and suggested that its issue should be kept back until the Committee's Report could be added thereto, when it would be at the service

of the Committee and members, who might feel interested in prosecuting inquiry.

Resolved,—That the present Committee be requested to continue their labours, and that all questions and communications addressed to the Secretary be referred to them, and hereafter embodied in a separate pamphlet.

Resolved,—That any incidental charges incurred by the Secretary, in forming a small experimental Nopalerie, be defrayed by the Society.

Resolved,—That Monsr. Richard be solicited to send the Society a supply of the description of Cactus, on which the insect has been imported.

Moved by Dr. Wallich, seconded by Dr. Jackson, that especial thanks be returned to the Bourbon Government and to Monsr. Richard, for the courteous and prompt manner in which they have carried into effect the Society's wishes in regard to a supply of the Cochineal insect, and that their further co-operation in this important matter be solicited.

Moved by Mr. Bell, seconded by Mr. Storm, that the special thanks of the Society be returned to Captain Charlton, for having imported from the Cape the Cochineal insect which, although of the wild variety, has been presented at a moment that renders it an object of valuable and interesting comparison.

Read a note from Mr. Marshman, of this date, forwarding one copy of vol. 5, Society's Transactions, and promising to send more in the course of the day.

The Secretary wished to have the Society's sanction to pay the charges of publication.

Moved by Dr. Jackson, seconded by Dr. Wallich, that as Mr. Marshman executes our printing on the most economical scale, the Secretary be authorised to pay his bills on presentation, and the receipt of the works for which each bill is made out. *Resolved* accordingly.

Read a letter from Monsr. Richard, of Bourbon, to Dr. Wallich, dated 29th November, advising despatch by the '*Robert Le Diable*' of 18 cases of Batavia Sugar-canes, intended for the Society's Nursery.

From Dr. Montgomerie, of Singapore, to the Secretary, dated 23rd December, enclosing a receipt for seven bundles of Sugar-cane, part of which he presents to the Society.

From Dr. Wallich, dated 25th January and 2nd February, enclosing separate reports from Mr. Masters, on the Sugar-canes received from Bourbon and Singapore, which are in good condition.

From His Excellency Sir B. Capel, Naval Commander-in-Chief, dated Trincomalee, 14th January, acknowledging receipt of Secretary's letter of the 23rd December last, requesting his aid in procuring supplies of Sugar-cane from the Island of Otaheite.

States in reply, that he would be most happy to meet the Society's wishes, but that the period of his command is so near a close, that he can do no more than recommend the measure to his successor Sir F. Maitland.

Read reports of the Agricultural Committee, dated 17th January, and 8th February, 1838.

Resolved,—That these reports be confirmed.

A letter from Major Sleeman, dated 18th January, acknowledging receipt of Secretary's letter of 15th idem, intimating the result of a resolution of the Society, passed at a general meeting on the 3rd Oct.

From Dr. Wallich, dated 13th February, forwarding for presentation to the Society, on the part of Mr. Mosely, Supercargo of the American ship '*Norfolk*,' a copy of No. 9, of vol. 3, of the Horticultural Register and Gardener's Magazine, and 9 copies of New England Farmer and Gardener's Journal, for July, August and September, published at Boston.

From the same, dated 15th January, giving some information on the subject of a specimen of Tea, presented to the December meeting by Mr. H. Walters, on the part of Mr. Wise.

From the same, dated 15th January, enclosing a note to his address from Captain Jenkins, under date the 30th ultimo, forwarding a sample of Moongah Silk of a superior description, on which he is anxious to have the opinion of the Silk Committee.

From Mr. Vety, Surgeon, H. C. Hulse, dated 12th November, Muttra, transmitting plan of a horse-breeding establishment, and conveying much information on the subject of the same.

From Captain Corbett, dated Almorah, 2nd January.

From W. Limond, Esq., Secretary to the Chamber of Commerce, dated 15th January, conveying, in reply to the Secretary's letter of the 4th instant, the best thanks of the association to Dr. Campbell, Officiating Resident at Nepal, for specimens of Nepaulese Paper, forwarded by that gentleman through this Society.

From J. F. Sandys, Esq., dated 12th January, enclosing copies of two papers lately received from T. Sandys, Esq., of Arrah, the first containing observations on queries regarding the two models of Machines for raising water, the second, conveying a few practical hints on the erection of No. 2 model.

From Dr. A. R. Jackson, dated the 27th January, acknowledging receipt of the several packages of books, &c. intended for Societies in England and Scotland alluded to in Secretary's letter, and promises to forward them to their respective addresses on his arrival in England.

From Messrs. Lyall, Matheson and Co., advising receipt of a bag of seeds for the Assam Agricultural Society, which they promise to despatch immediately.

From J. Vaughan, Esq. Librarian, American Philosophical Society of Philadelphia, dated 5th August, returning thanks on the part of that Society for the 2nd volume of our Transactions

From Lieutenant G. Pooley, R. N., Secretary to the Royal Horticultural Society of Cornwall, dated 3rd July, 1837, acknowledging receipt of the 2nd volume of our Transactions, and forwarding in return, a volume containing the first five Reports of their Institution: desiring to maintain a mutual correspondence on matters of interest.

From Mr. E. Norris, Assistant Secretary to the Royal Asiatic Society, dated 1st September, 1837, annexing an extract of a minute of the Committee of Correspondence of the Royal Asiatic Society, relative to the different breeds of Cattle known in India, and requesting the assistance of this Society in obtaining information on the subject.—*Referred to the Cattle Committee.*

From Dr. C. Huffnagle, dated 2nd February, enclosing a paper drawn up by Mr. J. H. Haines, relative to the cultivation and manufacture of Sugar in the districts of Benares, Mirzapore, Western Ghazee pore and Jaunpore.—*Referred to the Committee of Papers.*

From Lieutenant C. Burnett, Adjutant, Mhairwarrah Local Battalion, dated Behar, 1st November, 1837, forwarding by the hand of Dr. Maclean, the several packages of Cotton, alluded to in his letter of 27th October last, and requesting an opinion as to their quality.

From D. F. McLeod, Esq., dated Bancoorah, 3rd February. advising the despatch by dawk banghy, of the following obtained at that station: viz.

Three skeins of Tusser Silk.

Two cocoons, containing the living Chrysalis.

A small quantity of eggs and a piece of cloth made of the silk, stating that the texture of the cloth is superior to any he has met with in other parts of India.—*Referred to the Silk Committee.*

From James Prinsep, Esq., dated 27th January, forwarding a gold medal, and requesting to be informed if any more be required.

From Mr. J. W. Masters, dated 9th February, enclosing a paper containing a few remarks on the 'food of plants.'

From G. A. Prinsep, Esq., dated 9th February, offering a few hints for the better preservation and propagation of the cochineal insect.

From Dr. Wallich, dated 12th February, 1838, enclosing a note to his address from Mr. Masters, containing some observations on certain specimens of soils received from Mr. C. Manley, of Keerpoy, forwarding for presentation to the Society the specimens alluded to as also some articles of Pottery-ware made from them.

From Samuel Smith, Esq., dated 13th February, 1838, presenting to the Society 400 copies of a report of the anniversary dinner of the Society, which he was prevented from inserting in his daily paper, owing to indisposition, until it was too late.

From Captain H. Kirke to Dr. Wallich, dated 23rd January, on the subject of the growth of Sugar-cane.

Dr. Jackson presented a supply of seed barley for the use of the Agricultural Society.

JOHN BELL,

Secretary.

*Agricultural Society's Office, Town Hall,
Calcutta, 14th February, 1838.*

REPORT OF A COMMITTEE

Convened on the requisition of the President, Sir Edward Ryan, to examine certain samples of living Cochineal, brought from the Island of Bourbon and the Cape of Good Hope.

Present.

Dr. Strong, in the Chair.

Dr. Evans.

Dr. Goodeve.

Dr. A. R. Jackson.

W. Storm, Esq.

Dr. Huffnagle.

D. W. H. Speed, Esq.

Inspected two samples of living insects, the one brought from Bourbon, sent (under directions from the Island by Government) by Monsieur Richard, Superintendent of the Botanical Garden, on the '*Robert le Diable*,' the other brought from the Cape of Good Hope, by Capt. Charlton, of the Bengal Service, on the '*Sesustris*.'

The Committee are of opinion, that a most decided difference exists between the samples before them.

The Bourbon insect is clothed with a coat of powdery substance, is perfect in form, and large, having only a *slight appearance* of filament about the tail, which rubs to powder between the fingers.

The Cape insect is completely enveloped in down, and has *none* of the *mealy* deposit about it, which so strongly marks the character of the other.

As far as your Committee can decide, the insects before them, are as distinct as the '*Grana-fina*' of commerce is described to be different from the '*Grana-sylvestra*.'

The Committee beg to annex an extract of a letter from Monsieur Richard, to Dr. Wallich, dated St. Dennis, Isle of Bourbon, 29th November, 1837.

'Je suis bien impatient d'avoir des nouvelles de nos voyageurs Cochenilles. S'il en arrive de vivantes à Calcutta, comme je le pense, elles seront peut-être couvertes de duvet, parcequ'elles, auront été enfermées et pour ainsi dire, privées d'air, mais ceci ne doit pas vous faire prejurer de leur mauvaise qualité, car quand elles sont sur des Nopals, au grand air elles deviennent presque nues lorsqu'elles sont à leur grosseur.'

This extract your Committee consider fully borne out by the present appearance of the insect, and although they do not feel competent to say with certainty, that the large insect is the *Grana-fina*, (none of your Committee having seen the insect alive,) they have observed enough to convince them that it appears *far superior* to what is described, by the best authors, as the *Grana-sylvestra*.

The Committee request that the Cochineal be left in the hands of Mr. Bell, for further experiment.

(Signed) F. P. STRONG.	(Signed) GEO. EVANS.
W. STORM.	D. W. H. SPEED.
H. H. GOODEVE.	C. HUFFNAGLE.
A. R. JACKSON.	

*Agricultural Society's Office, Town Hall,
Calcutta, 8th February, 1838.*

A Meeting of the Agricultural Committee took place at the Residence of Dr. Wallich, on Wednesday evening, January 17th, 1838.

(Read 14th February, 1838.)

Present.

N. Wallich, Esq. M. D.

C. Huffnagle, Esq. M. D.

W. F. Gibbon, Esq.

John Bell, Esq.

The Committee visited the Nursery, and found the newly extended Sugar-cane cultivation looking well, notwithstanding the unprecedented drought.

The young Guinea grass plot was looking well, most of the plants having taken root.

The people employed digging and liming the ground, yet unappropriated, for the reception of cane expected from Bourbon and Jubbulpore.

A Meeting of the Nursery Committee took place at the residence of Dr. Wallich, on Thursday evening, the 8th February, 1838.

(Read 14th February, 1838.)

Present.

N. Wallich, Esq. M. D.

C. Huffnagle, Esq. M. D.

W. F. Gibbon, Esq.

John Bell, Esq.

The Committee have to report a continued extension of the Sugar-cane cultivation.

They have received since their last report, 18 cases of superior cane from Monsieur Richard, of Bourbon, and four bundles of Singapore cane from Dr. Montgomerie, of that Island; both consignments received in excellent condition, which have been all planted out.

Resolved,—That the remaining old Otaheite cane from Bombay, be cut down and planted out in the Cotton lands.

Resolved,—That the special thanks of the Committee be given to Monsieur Richard and Dr. Montgomerie, for their great kindness in sending these supplies.

Resolved,—That with reference to the particular interest which Dr. Montgomerie, of Singapore, has taken in the proceedings of this Society, by sending us from time to time supplies of Sugar-cane, the Committee beg to recommend that the Society's Gold Medal be awarded to Dr. Montgomerie.

(Signed)

W. F. GIBBON.
C. HUFFNAGLE.
W. STORM.
N. WALLICH.
T. LEACH.
J. BELL.

Agricultural and Horticultural Society of India.

A General Meeting of this Society was held at the Town Hall, on Wednesday morning, the 14th of March.

Present.

The Honorable Sir E. Ryan, President, in the Chair.

Dr. Wallich, Dr. Huffnagle, Col. D. McLeod, W. Storm, Esq., T. Leach, Esq., C. K. Robison, Esq., R. Watson, Esq., A. Beattie, Esq., W. Mackenzie, Esq., Dr. Strong, Dr. H. H. Spry, W. K. Ewart, Esq., W. F. Gibbon, Esq., A. Dobbs, Esq., C. Trebeck, Esq., A. Grant, Esq., D. Hare, Esq., J. H. Stocqueler, Esq., C. R. Prinsep, Esq., M. A. Bignell, Esq., R. Smith, Esq., C. A. Dycc, Esq., E. Preston, Esq., J. W. Masters, Esq., Captain W. N. Forbes, and John Bell, Esq.

Visitors.

Messrs. Brockman and Shofforth, introduced by Dr. Strong, W. Dent, Esq. and C. Brownlow, Esq.,

The proceedings of last meeting were read and confirmed.

The following gentlemen, proposed at last meeting, were elected members of the Society, viz.

W. Moran, Esq., Thomas Parker, Esq., J. H. Savi, Esq., The Rev. C. E. Driberg, Thomas Bracken, Esq., Charles Oman, Esq., J. Lewis, Esq. C. S., J. B. Elliot, Esq. C. S., R. S. Thomson, Esq., Captain H. J. Wood, W. Rushton, Esq., T. P. Morrell, Esq.

The following gentlemen, were proposed as members.

<i>Names.</i>	<i>Proposed by</i>	<i>Seconded by</i>	
Geo. Palmer, Esq., (Pur- neah,)	J. F. Cathcart, Esq.,	} The Secretary.	
Major General Ogländer, F. L. Beaufort, Esq. C. S.	Lieut. Sibley, Col. McLeod,		
Thomas Brae, Esq.	Thomas Leach, Esq.	W. Kettlewell, Esq.	
W. Dent, Esq. C. S.	Dr. Wallich.	Captain Forbes.	
H. Fitzgerald, Esq., (Tir- hoot,)	} The Secretary.	Dr. Wallich.	
Geo. Osborne, Esq., (Chu- nni,)			W. Storm, Esq.
N. Hudson, Esq.,			W. Storm, Esq.

Motions of which notice was given at last meeting, disposed of.

No. 1. The Agricultural Committee's recommendation to present Dr. Montgomerie of Singapore with the Society's gold medal was brought forward, and discussed.

Mr. C. K. Robison proposed as an amendment, seconded by Mr. A. Grant, that the silver medal be substituted for the gold medal, which amendment being put to the vote, was carried.

No. 2. The President's motion that the expense incurred by the Secretary in publishing a pamphlet on Cochineal, be defrayed by the Society. *Resolved*, that the Society bear the expense.

No. 3. Dr. Wallich's motion recommending that a small sum be placed at the disposal of Lieut. Kirke, of Deyrah Dhoon, was next brought forward.

Dr. Wallich informed the meeting, that he had been reminded by the Secretary of an offer made by Dr. Campbell, of Nepaul, similar to that for which he sought the aid of the Society in behalf of Deyrah Dhoon which remained in abeyance, waiting the decision of the Committee. Dr. Wallich's letter and Dr. Campbell's notice of motion had therefore been before the Committee since last meeting, and the result was a recommendation that a trial should be given to the valley of Nepaul, as well as that of Deyrah Dhoon.

Proposed by Mr. Robison, seconded by Dr. Wallich, that the motion of Dr. Wallich, in its amended form, as recommended by the Agricultural Committee, be discussed and settled at the next General Meeting. Agreed accordingly.

NOTICES OF MOTIONS.

No. 1. Dr. Wallich's original motion, No. 3 of last meeting, with the amendment recommended by the committee, viz :-

That 200 Rs. be placed at the disposal of Dr. Campbell of Nepal, and the same sum at the disposal of Lieut. Kirke of Deyrah Dhoon, for the purpose of enabling those gentlemen to furnish this Society with seeds, plants and grafts of European vegetable and fruit trees, in an acclimated state, as an experiment, to be discontinued if the trial does not succeed.

No. 2. Proposed by C. K. Robison, Esq., seconded by W. K. Ewart, Esq. That this Society make some acknowledgment to Signor Mutti, for his exertions amidst many difficulties in cultivating the standard mulberry tree in the Deccan, by which the production of silk has been rendered eminently successful, both in quality and cheapness, and that for this purpose the gold medal of the Society be awarded to him.

REPORTS.

Read reports of the Agricultural Committee, on meetings held on the 26th February, and 10th March.

The Secretary brought to the notice of the Meeting that a vacancy existed in the Committee appointed to conduct inquiry respecting the Cochineal lately imported, and the president having named Dr. Spry, that gentleman agreed to act, and was elected.

The Secretary read to the Meeting a report drawn up by him respecting the two varieties of Cochineal committed to his care by the Society, and on the wild insect common in India, which he has brought under cultivation, to contrast with those imported from Bourbon and the Cape.

Proposed by Mr. Robison, seconded by Dr. Strong, that this report be made over to the Committee.—

Proposed by Sir E. Ryan, that as the attention of the Society has lately been given to the improvement of Wool, the assistance of their visitors (Messrs. Brockman and Shofforth, who are now about to depart for Australia) should be requested towards importing Merino rams from that colony, and that the matter be referred to the cattle Committee for the arrangement of details, &c.—*Resolved* accordingly.

Read the amended rules of the Society as revised by the Committee of papers, under directions from the Society which having undergone a few slight alterations while discussed,—

Proposed by Mr. Robison, seconded by Dr. Strong, and *Resolved*, That the same be confirmed and adopted as the rules of the Agricultural Society of India.

Read a letter from Signor G. Mutti, dated Bombay, 31st January, 1838, presenting to the Society a copy of his "Guide to the Silk Culture in the Deccan."

From J. Little, Esq. dated Bombay, 9th February, 1838, presenting, on the part of the Agricultural Society of Western India, two copies of Signor Mutti's Silk Culture Guide.

From Dr. Wallich, dated March 9th, presenting a copy of the same Guide.

From Dr. H. H. Spry, dated 7th March, presenting to the Society a copy of his work on "Modern India."

From the same, dated 9th March, requesting to be furnished with a supply of Otaheite sugar-cane for trial at Russapuglah, the soil in that quarter being considered well adapted for its growth.

From H. Piddington, Esq. dated 1st March, presenting to the Society a quantity of American maize, and a stocking made from the Nankin or Siam cotton.

From the same, offering to forward a French translation from the Spanish, of a valuable pamphlet in his possession, on the subject of Cochineal.

Memo. The Secretary had since received the pamphlet, a part of which Mr. Piddington had translated into English for the use of this Society in 1825, and Mr. Bell, had completed the translation which was this day submitted.

From Monsieur Parquin, dated 23rd February, states that after a careful examination of the Cochineal insects lately received from Bourbon and the Cape, he can affirm that the Bourbon insect is *the true Grana-fina*.

From Mr. Assistant Surgeon J. T. Pearson to Sir E. Ryan, dated Juanpore, 24th February, on the subject of *Cochineal*. *Resolved*, That the pamphlet, Mr. Parquin's and Mr. Pearson's communications, be handed over to the Committee.

From Lieutenant C. Brown, dated Jubbulpore, December 15th, 1837, forwarding the promised Otaheite sugar-cane cuttings from Major Sleeman's plantation.

From Dr. Wallich, dated 23rd February, enclosing a report by Mr. Masters, on the condition of the sugar-canes received from Jubbulpore.

These canes 1,147 in number are reported in most excellent condition, not a single failure; the canes had been carefully packed in bundles of 10 each, and bound from end to end with haybands, and kept constantly moistened with water.

The average length of these canes was 9 feet, the average circumference 6 inches.

From W. Forster, Esq. to the Secretary, dated "Melville," Mauritius, December 26th, advising the despatch per "Mona," of 4 casks containing sugar-cane tops, which have been transmitted for the use of the Society at the request of the Honorable W. H. L. Melville.

From Dr. Wallich, dated 2nd March, enclosing Mr. Master's Report on the sugar-cane tops received from the Mauritius, which states that they have arrived in a living though very weak and sickly condition.

These cane-tops were packed in dry sand, but too many were packed in each cask.

From G. U. Adam, Esq. dated 24th February, enclosing copy of a letter from Mr. N. Savy dated Port Louis, 26th November, 1837, to the address of Messrs. Scott and Co. of Mauritius, which intimates the despatch of 11 bags of Seychelles cotton seed, carefully selected at Mahé, for the use of this Society, and states that a further supply will soon be forwarded. These 11 bags have arrived by the "Mona."

From Dr. Wallich, dated 20th February, enclosing a letter from Monsieur Parquin, presenting to the Society a paper containing hints respecting the management, &c. of sugar-cane in the Islands of Bourbon and Mauritius.

From Rajah Kalikrishna Bahadoor, dated 23rd February, forwarding for presentation to the Society a sugar-cane, called "Pooree-Ook," 18 feet in length, and 5 inches in circumference.

From Lieutenant Vetch, dated Tezapore, February 13th, advising the despatch of a maund of caoutchouc; giving some information as to the method pursued in preparing it, and offering to render any further assistance on the subject.

From J. Forbes Royle, Esq. M. D. to H. H. Spry, Esq. M. D. dated London, 12th July, 1837. Enclosing a sheet of his forthcoming work, entitled "Illustrations of the Botany of the Himalaya Mountains," which affords information respecting caoutchouc-yielding trees found in the districts of Assam and Sylhet, adding further information as to the best mode to be adopted in the collection of caoutchouc.

From Capt. F. Jenkins, dated Rangoon, Upper Assam, February 3rd. In reply to the Secretary's letter on the subject of Area cocoons, states his intention of having a quantity of living cocoons and eggs, forwarded for further experiment. Inquiring if sugar-cane can be propagated by means of seed? Acknowledging receipt of books, cotton, &c. seed.

From W. Kerr Ewart, Esq., dated 27th February, 1838, forwarding some cocoons received from Signor Mutti, of Bombay.

From Major E. Gwatkin, Superintendent of the H. C. Stud, Haupper, dated 7th February, acknowledging the receipt (through the Military Board) of a quantity of guinea-grass seed, and oat seed sent by the Society.

Stating that he has made experiments both on the huskless oats and Italian rye-grass received some time ago from the Society, that he has failed with the former, but succeeded with the latter, offering to forward some oat seed, the produce of a small quantity received from the Cape.

From R. Lowther, Esq. dated 14th February, acknowledging the receipt of Secretary's letter of the 18th December last, on the subject of transmitting sugar-cane from Jubbulpore. Advises despatch of two bottles of mangel-wurzel seed, recently received from England; gives an unfavorable account of the vegetation of the American cotton seed sent up by the Society last year, and distributed by Mr. Turner in the Bundelcund and Allahabad districts, owing it is supposed, to the unprecedented drought.

From Baboo Pearychund Mitter, forwarding a small sample of the wild Cochineal insect, received from Bancoorah as picked indiscriminately from the jungle.

From F. Campbell, Esq., Secretary to the Branch Agricultural Society of Midnapore, dated 22nd February, giving an unfavorable account of the vegetation of the several varieties of cotton seed, received from the Society, and distributed by him in that district.

From the same, forwarding a small parcel of a very singular description of cotton seed, grown at Dholboon, a village about 90 miles to the N. W. of Midnapore, together with a sample of corn, and giving a short account of them.

From Ross D. Mangles, Esq., Secretary to Government, Revenue Department, dated 20th February, acknowledging receipt of 8 copies of vol. V. Transactions of this Society for the use of Government, and asking for two complete copies of vols. I to IV.

From Baboo Rajkissore Mokerjee, dated Hazareebaugh, February 22nd, forwarding a sample of cotton, the produce of Sea Island seed, received from the Society, and asking for further supplies for distribution in that district.

From Col. L. R. Stacy, dated Dacca, March 4. intimating his intention of establishing a small experimental garden at that station, and requesting a supply of plants, seeds, &c.

From Dr. Wallich, dated 6th March, forwarding 39 copies (one copy formerly sent) of Mr. Bruce's "Account of the manufacture of the black tea, as at present practised at Suddya."

From Dr. A. Jackson, dated 17th February, acknowledging receipt of, and promising to have delivered to their respective addresses, several more parcels containing copies of the Transactions of the Society intended for Societies in England and Scotland.

The following presentations, in addition to those already noted, were submitted.

From the Coal Committee, a copy of "Reports of a Committee for investigating the coal and mineral resources of India."

From Mr. G. Pratt, Specimen of Cochineal which had been in his possession 18 years.

From Don Ramon de la Sagra, through Dr. Wallich, the Prospectus of a work about to be published by him to be entitled, "The Political, Physical and Natural History of the Isle of Cuba."

From W. F. Gibbon, Esq. two samples of wool, viz. one from an imported Merino ram; one from a lamb of 5 months.

Dr. Strong presented a log of *Buckum* wood, grown at Russapuglah, together with some seeds of the same.

Dr. Huffnagle presented some leaves of American maize, grown in his garden, very prettily variegated.

Lieutenant Vetch presented, through Dr. Wallich, a bottle containing seeds of the *Ficus Elastica*.

Mr. R. Smith submitted at the Meeting an artificial hive full of bees, and invites those interested in the question, to visit his garden in Park Street, any morning between 7 and 9 o'clock, where they may be seen working.

The thanks of the Society were ordered to be offered for all these communications and presentations.

JOHN BELL, *Secretary.*

*Agricultural Society's Office, Town Hall,
Calcutta, 14th March, 1838.*

PROCEEDINGS OF THE NURSERY COMMITTEE.

(Read 14th of March, 1838.)

A Meeting of this Committee took place at the residence of Dr. Wallich, on Monday evening, the 26th February, 1838.

Present.

N. Wallich, Esq. M. D.

W. Storm, Esq.

Thomas Leach, Esq.

John Bell, Esq.

The Secretary read a letter from W. Forster, Esq., to his address dated "Melville," Mauritius, December 26th, intimating that he had shipped, by desire of the Honorable W. H. L. Melville, 4 cask of sugar-cane heads, packed in sand, for the use of this Society by the "Mona," Captain Gill.

These casks were received while the Committee were present, and all opened for inspection. The sand was considerably heated, and from the cursory examination of their contents the Committee think that about *one-third* only may be found in a vegetating condition.

Resolved,—That the plants be immediately put into a hopper.

Read a letter from G. U. Adam, Esq., of the firm of Messrs. Adam, Scott and Co. dated February 24th, forwarding a letter to the address of Messrs. Scott and Co. of the Mauritius from Mr. Savy dated 26th November, 1837, advising the despatch of 11 bags of Seychelles Cotton Seed, for the use of this Society, and giving some information on the mode of cultivating the Cotton.

Resolved,—That the Secretary do take such steps, as he may deem most expedient, for its immediate distribution, and that it be advertised.

Resolved,—That an extract from Mr. Savy's letter be printed, and sent with each parcel distributed.

Dr. Wallich informed the Committee, that the first supply of Otaheite sugar-cane, from Major Sleeman's plantation at Jubbulpore (1,147 canes) had arrived, and he had the gratification to inform the Committee, that *not one* out of the whole despatch had been received in bad condition. The average of these canes is 9 feet in length, and 6 inches in circumference. They are packed 10 canes in each

bundle, bound tightly round by haybands, and kept moist by watering slightly in transit. In this manner they have reached Calcutta as fresh as when cut.

The greater part of these had been already planted out, and the remainder will be in the ground on Thursday next.

Dr. Wallich had anticipated the Committee's wishes in putting two additional plots of ground, occupying more or less five beegahs, under the hoe, for the reception of the remainder of this splendid cane.

The whole of the grounds allotted for the nursery has been nearly planted out in sugar-cane and will be completely so in the course of a few days, all the cotton beds having been broken up to make room for the cane, in accordance with the original intention of the Society.

With reference to the expectation of a much larger supply of sugar-cane from Jubbulpore, which have been commissioned in the Secretary's letter to Lieut. Brown, of the 18th December 1837, and to which no answer has been received, and to the offer of Dr. Wallich, to meet the demand for ground to the utmost in his power, the Committee *Resolve*,—That it is expedient to incur some extra expense, and that it be left to Dr. Wallich to adopt such measures as will admit of his carrying the Committee's resolutions into effect without further reference.

Resolved,—That the Secretary be directed to indent for a further supply of oil-cake.

FURTHER PROCEEDINGS OF THE NURSERY COMMITTEE.

(Read 14th of March, 1838.)

At a Meeting of the Committee at the Residence of Thomas Leach, Esq., Garden Reach, on Saturday evening, 10th March, 1838.

Present.

N. Wallich, Esq. M. D.	Thomas Leach, Esq.
W. Storm, Esq.	W. F. Gibbon, Esq.
John Bell, Esq.	

Read a letter from Dr. Spry to the Secretary dated 9th March, asking for a supply of Otaheite sugar-cane, for the purpose of being planted at Russapuglah, where the soil is represented by Drs. Strong and Spry, as peculiarly well adapted for the cane.

Resolved,—That Dr. Spry be supplied with a part of the sugar-cane tops recently received from the Mauritius and which are now in a hopper.

Resolved,—That Dr. Spry be also supplied with some of the China sugar-canes from the nursery.

The Committee having inspected the Society's Nursery this afternoon, are able to speak favorably of the general appearance of the cane cultivation. The whole of those recently received from Major Sleeman have been planted out, and most of them are already sprouting.

More ground was being trenched for expected supplies from Jubulpore, applied for by the Secretary in a letter to Lieut. Brown, dated December 18th.

(Signed) N. WALLICH,
 „ W. F. GIBBON,
 „ THOMAS LEACH,
 „ CHARLES HUFFNAGLE,
 „ W. STORM,
 „ JOHN BELL.

APRIL 11, 1838.

Agricultural Society of India.

A General Meeting of this Society was held in the Society's Apartment, Town Hall.

Present.

The Honorable Sir E. Ryan, President, in the chair.

Dr. Wallich, Dr. Strong, Mr. W. Cracroft, Mr. G. A. Prinsep, Mr. A. Colvin, Mr. J. P. Marcus, Mr. C. K. Robison, Mr. N. Alexander, Mr. A. Harris, Mr. T. S. Kelsall, Lieut. Sibley, Mr. T. Bracken, Mr. R. S. Strickland, Mr. F. T. Fergusson, Mr. R. Smith, Mr. E. Preston, Mr. D. Hare, Mr. C. Dearie, Mr. R. S. Thomson, Mr. J. W. Masters, Mr. W. K. Ewart, Mr. W. F. Gibbon, Dr. H. H. Spry, Mr. A. H. Sim, Mr. John Bell.

Visitors.—Messrs. G. C. Richardson and T. Hugon.

The Proceedings of last meeting were read and confirmed.

The following gentlemen, proposed at the last meeting, were elected members of the Society.

Geo. Palmer, Esq., Major-Gen. Oglander, F. L. Beaufort, Esq. C. S., Thomas Brae, Esq., H. Fitzgerald, Esq., Geo. Osborne, Esq., N. Hudson, Esq., W. Dent, Esq. C. S.

The following gentlemen, were proposed as members.

<i>Names.</i>	<i>Proposed by</i>	<i>Seconded by</i>
Dr. Jas. Morton, (Sen. Asst. to the Commr. of Arracan.)	Captain Bogle,	} The Secretary.
Wm. Bennet, Esq. (late of Demarara.)	Dr. W. G. Maxwell,	
Wm. Agnew, Esq.		
Robert Campbell, Esq.	D. W. H. Speed, Esq. A. Colvin, Esq.	
Andrew Sym, Esq.		
K. M. Scott, Esq. (Asst. Surgeon Gowhatti.)	Captain Jenkins,	
Muneram Bur Bindaree.		
Lieut. J. G. Gerrard, (European Regt.)	C. K. Robison, Esq.	
John Guilding, Esq. (late of St. Vincents.)		
G. C. Richardson, Esq. (late of Jamaica.)	The Secretary,		Dr. Wallich. W. K. Ewart, Esq. R. Watson, Esq. C. Dearie, Esq.

Motions of which notice was given at last meeting, disposed of, viz. :—

No. 1.—Carried.

No. 2.—Carried.

NOTICES OF MOTIONS.

No. 1. Proposed by Dr. Wallich, seconded by Dr. Spry,—That with a view to the advancement of agricultural knowledge, and the development of the resources of British India, it appears desirable to extend the list of rewards and prizes already held out by the Society, by adding a number of others of a more specific nature; and that a pecuniary reward, not exceeding 2000 Rs. nor less than 1000 Rs. and the Society's gold medal, be awarded to the best practical Agricultural Treatise founded on local experience, on any of the under-mentioned subjects, viz :—

Cereal Grains.	Cotton.	Silk:	Tobacco.
Sugar.	Indigo.	Coffee.	Dyes generally.

To these may perhaps be added vegetable fibre, gums, extracts and resinous substances, oils, caoutchouc, cochineal, with some modifications.

The condition of the above rewards will of course, have to be considered hereafter in detail. It may not, however, be out of place, to submit the following outline of them :—

1st. As to the time in which the Treatises are to be sent in.

2nd. The successful Treatise to be the property of the Society, unless the author engages to publish in this country, within —

months, or in England within — ; with an agreement to provide the Society at cost price with any number that may be required, (of which timely notice to be given to the author.)

3rd. The Society reserves to itself the right of rejection, without assigning any reason, restoring of course, any Treatise so rejected, to the author.

4th. The Society likewise to have the privilege of dividing the pecuniary reward allotted to any one subject, between two or more competitors, who may be deemed to have equal claims to it ; in which case the demand is to be computed at the maximum rate of 2000 Rs. and the gold medal, presented to each of the candidates.

No. 2. Proposed by Dr. Wallich, seconded by Mr. Bell ; that a reward of ten rupees be given to Mr. N. Alexander's gardener, for producing fine artichokes.

No. 3. Proposed by Mr. Bell, seconded by Dr. Wallich, that a reward of five rupees be given to Mr. E. Preston's gardener, for producing fine parsnips.

REPORTS.

Read Committee's Report on samples of Cotton, sent by Lieut. Burnett, of Mhairwarrah, on the part of Captain Dixon, and on a sample from R. Davidson, Esq., the produce of the same place.—Referred to the Committee of Papers for publication.

Read Report of the Proceedings of the Cattle Committee, on the motion of the President made at last meeting. The Secretary had printed all the information already collected, and had sent copies to parties named in the report, and to many others.

Resolved,—That the replies when received, be handed over to the Committee, for consideration, and publication, if necessary for the information of the Royal Asiatic Society.

The Secretary informed the members that the American Plough, so much spoken of at Bombay, and of which a model had been solicited by the Society, had been lately received, together with 3 spare shares and iron work complete.

The Secretary had with the concurrence of the Agricultural Committee, disposed of two of these shares to Messrs. Lyall, Matheson, and Co. for prime cost and charges, and had lent the complete plough as a pattern for the wood part, one share remains for disposal.

As Mr. Harris expressed a wish to make a trial of the complete plough, it was proposed by Dr. Wallich, seconded by the Secretary, and *Resolved*,—That the plough shall be placed at Mr. Harris's disposal, on that gentleman engaging to give the Society the result of the trial.

The Secretary brought to the notice of the meeting, the suggestion which had been made by him to the Committee of Papers, in December last, (vide Appendix to vol. 5, page 106,) and which had not yet been sanctioned, viz. :—to have the Monthly Proceedings, as published in the papers, circulated in the shape of a pamphlet, to corresponding, and all similar Institutions, to members generally, and others who take an interest in the objects of this Society. The Secretary had already printed the Proceedings for January, February and March, and now, with reference to Mr. Marshman's estimate of the charge, wished the Society to sanction the expense, as it would be the means of maintaining a constant and regular source of information.

The President observed, that this ought to be a regular motion ; but as the utility of the measure would be apparent to all, and the expense so trifling, he thought, if no objection was taken to it, the present meeting might dispose of the question, to enable the Secretary to print off the Proceedings without delay.

Resolved nem. con.

Read a letter from J. C. Marshman, Esq., dated Serampore, March 23rd, stating his inability from untoward circumstances, to continue the publication of the Society's Transactions.

From the Rev. J. Thomas, Superintendent of the Baptist Mission Press, dated March 29th, expressing his willingness to undertake the printing of the Transactions at a certain rate.

From Mr. Ridsdale, Superintendent of the Bishop's College Press, enclosing an estimate of the expense of printing the Transactions.

Resolved. That the Secretary on reference to Mr. Thomas's terms of printing, be requested to treat further on the subject, and that the Secretary shall make such arrangements with either press, as he may deem judicious.

Read a letter from Mons. Perottet to Dr. Wallich, dated Kaittee, Neilgherries, March 16.

Mons. Perottet, who has published a Treatise on the Wild Cochineal assures Dr. Wallich, that the insect sent by Mons. Richard to

this Society is really the *fine Cochineal* called "Mesteque" or *Grana-fina*, and that the plant on which the insect arrived, is the true "Nopal of the Căstilians."

Mons. Perottet saw both at Bourbon, on his way to India, and requested Mons. Richard to forward a small supply to him at Pondicherry; but they arrived when he was in the Neilgherries, and the native gardeners to whom they were entrusted, allowed both the insect and the plant to die.

Mons. Perottet refers Dr. Wallich to Mons. Delissert a naturalist, for a corroboration of his perfect conviction, which he says admits of no doubt, as to the insect being the true *Grana-fina*.

From J. P. Marcus, Esq., a sample of wild Cochineal, collected by him in 1837, and a supply of Roosa Grass oil seed, together with some living plants of the same.

Read the following extract of a letter from Major Sleeman, to the Secretary, dated Jubbulpore, March the 24th, on the cultivation of Lac Dye.

"Though Europeans have been manufacturing the Lac Dye for 40 years at Mirzapore, not one of them was aware that it was cultivated till I told them in November last year. The little insects are regularly every season applied to the trees on which they thrive best; they thrive best on the Kesoo (*Butea frondosa* of botanists) commonly called the Dhak tree, and the produce of this tree is called Nugowlee. The merchants at Mirzapore knew that this was the finest quality of the Lac, but did not understand why."

Read a letter from Dr. Wallich, dated March 15th, enclosing a letter from Lieut. Brown, forwarding a further supply of 900 Otaheite canes from Major Sleeman's plantation at Jubbulpore,—annexing Mr. Master's Report on the canes, shewing that they were all in excellent condition.

From Major Archer to Dr. Wallich, dated Bourbon —, forwarding four cases containing Sugar-cane Tops.

Captain Hullock of the "Donna Pascoa," presented 12 casks and 9 half-casks of Sugar-cane Tops, which he brought from the Mauritius, but which, excepting a few in the half-casks, were all dead.

Read a letter from Dr. Spry, presenting a specimen of Caoutchouc, on behalf of Lieut. Wemyss of the Assam Local Battalion.

From Lieut. Vetch, a chest containing Caoutchouc, which comprised the condition of awarding the gold medal to that gentleman.

From Captain Bogle, dated Akyab, March 8th, advising despatch of a sample of salt, together with several specimens of Caoutchouc collected in the neighbourhood.

Promising to forward specimens of the several varieties of timber common in the district; asking for supplies of Cotton, Paddy, &c. seed.

From Col. Caulfield, dated Berhampore, March 9th, forwarding samples of Upland Georgia Cotton, and Sandoway Tobacco, produced in the experimental garden at that station.

From H. Cope, Esq., Secretary Agricultural Society of Meerut, dated March 11th, advising despatch of samples of Upland Georgia, Egyptian, &c. Cotton, reared in their garden at that station, from seed supplied by this Society.

From the same, dated March 31st, intimating the despatch of these samples, which was delayed, owing to the Secretary being ill.

From J. Vaughan, Esq., Librarian of the American Philosophical Society, dated Philadelphia, October 13th, 1837, transmitting a copy of part 2, vol. 4, Transactions of the Society.

From W. Brockman, Esq., dated Calcutta, March 28th, acknowledging receipt of seeds and the Transactions of the Society, and promising to be the medium of opening a correspondence between the Western Australian Agricultural Society and this Institution.

From Dr. Wallich, dated April 4th, presenting in the name of Captain Jenkins, a copy of the 5th Report of the Horticultural Society of Cornwall, and a copy of Proceedings of the Annual Meeting of 1837, of the Royal Institution of Cornwall.

From the same, dated March 23rd, forwarding for presentation to the Society on behalf of Captain Jenkins, a specimen of a sort of Hemp called "Rheea," and a specimen of Indian Corn grown by the Meris.

From the same, dated March 13th, forwarding a small sample of Indigo sent down by Captain Jenkins, manufactured in Assam, by Mr. Grose, from a plant closely allied to the Ruellia plant.

From W. F. Fergusson, Esq., extract of a letter to the Secretary, dated 7th April, presenting a small bag of Indigo seed, gathered by Dr. D. Campbell, on the banks of the Nile. Dr. C. describes the leaves of the plant as larger, and looking richer than those of this country.

From R. Smith, Esq., dated March 22nd, offering a few remarks on the domestication of the Wild Honey Bee.

From Baboo Rajnarain Day, dated March 17th, presenting to the Society an "Essay on the Agriculture of Bengal," of which he is the author.

From Mr. J. W. Masters, dated April 7th, enclosing a paper, containing some remarks on the propagation of plants.

From the same, forwarding 10 seers of Egyptian Cotton seed, a quantity of Sorghum Vulgare, and Persian Tomato seed, grown in the Society's nursery.

From H. Piddington, Esq., dated March 26th, forwarding for distribution, a small quantity of Asparagus Bean.

From Major J. A. Moore, dated Hydrabad, March 12th, advising despatch of three potatoes, grown in his garden.

From B. Hodgson, Esq., dated Nipal, March 18th, offering to forward a supply of Red and White Clover seed, and asking for some fresh European vegetable seed.

From Mr. C. N. Villet, dated Cape Town, January 16th, in reply to Secretary's letter of 16th October, on the subject of the Society's annual indent for seeds, promises to forward the quantity ordered, so as to reach Calcutta by the middle of August.

From Dr. Campbell, a box containing a variety of the agricultural productions of the valley of Nipal, adverted to in his letter of the 28th January.

From Mr. Waghorn, a case of Egyptian Cotton seed, referred to in his letter to the Secretary, of 22nd October, 1837.

From Captain H. J. Wood, samples of wool of the Jeypore sheep.

From Mr. A. Harris, a small quantity of Cotton grown in the Soonderbuns, said to be from Sea Island seed.

Mr. E. Preston, presented a basket of very large Parsnips, produced in his garden from Cape seed.

Mr. N. Alexander submitted some very fine specimens of Artichokes, produced in his garden.

Proposed by Dr. Wallich, seconded by Mr. Cracroft, that Mr. Alexander be solicited to favor the Society with a memorandum, as to the mode pursued by him in cultivating his Artichokes.

The thanks of the Society were ordered to be offered for all the foregoing communications and presentations.

JOHN BELL, *Secretary.*

*Agricultural Society's Office, Town Hall,
Calcutta, 1th April, 1838.*

MAY 9, 1838.

Agricultural Society of India.

A General Meeting of this Society was held in the Town Hall.

Present.

N. Wallich, M. D., V. P., in the Chair.

Messrs. A. Colvin, W. Storm, M. S. Staunton, W. Ainslie, R. S. Strickland, J. W. Masters, Drs. Strong, Spry, and Huffnagle, Lieut. Abercrombie, Messrs. John Allan, A. Grant, T. Brae, T. Palmer, G. T. F. Speed, C. Dearie, C. Trebeck, F. L. Beaufort, D. W. H. Speed, Col. McLeod, Dewan Ramcomul Sen, Baboo Dwarkanath Tagore, Messrs. T. Holroyd, Jas. Collie, R. Smith, C. A. Dyce, R. Watson, F. T. Fergusson, C. K. Robison, G. A. Prinsep, W. Speir, T. S. Kelsall, D. Hare, E. Preston, T. P. Morell, and John Bell.

Visitors.—Lieut. Montrieu, and Mr. C. Brownlow.

The proceedings of last Meeting were read and confirmed.

The following gentlemen proposed at the last meeting were duly elected members of the Society.

Dr. James Morton, W. Bennet, Esq., Wm. Agnew, Esq., Robt. Campbell, Esq., Andrew Sym, Esq., K. M. Scott, Esq., Assistant Surgeon, Muneeram Bur Bindaree, Lieut. J. G. Gerard, John Guilding, Esq. G. C. Richardson, Esq.

The following gentlemen were proposed as members.

<i>Names.</i>	<i>Proposed by</i>	<i>Seconded by</i>
Capt. H. Macfarquhar, of Tavoy,	The Secretary.	Dr. Wallich.
Dr. James Hutchinson,		
Thomas Savi, Esq. of Kishnaghur,	C. Deverinne, Esq.	The Secretary.
E. Mackintosh, Esq.		
G. T. Cockburn, Esq.	J. F. Cathcart, Esq.	The Secretary.
C. S. Baboo Keenut Singh, Purneah,		
G. G. Mackintosh, Esq.	The Secretary.	W. Storm, Esq.
C. S. Purneah, Rajah Nursingchunder		
Roy, F. Kirchoffer, Esq.	G. Preston, Esq.	The Secretary.
C. M. Hunter, Esq. and G. Austin, Esq. Jessore,		
	G. U. Adam, Esq.	

Motions of which notice was given at last meeting.

No. 1.—Dr. Wallich's motion, to offer Premiums for Essays on particular subjects, was brought forward and discussed. As there appeared to be considerable difference of opinion on the propriety of offering rewards on Essays, while the sum of four thousand rupees was already set aside for the best work on Indian Agriculture in all its branches, and as it became a question whether the Funds of the Society were adequate to meet the outlay contemplated by this motion with reference to other objects for which the Society had already pledged itself, Dr. Spry, as the seconder of the original motion, moved as an amendment, seconded by Mr. G. A. Prinsep,

That the four articles following be assigned as the staple articles deserving of the Society's support, for practical treatises, viz., cereal grains, sugar, silk and cotton; and that the details be referred to the General Committee for report. Amendment carried. The Secretary here submitted an account current, dated 30th April, 1838, from F. Macnaghten, Esq., shewing that the Society has 19,900 rupees invested in Government Securities, 10,000 of which are locked up to meet the Society's engagements, for the offer of premiums already voted away.

Motions Nos. 2 and 3 carried *nem. con.*

NOTICES OF MOTION.

No. 1. Proposed by John Bell, seconded by W. Storm, Esq.

1st.—That as most of the European vegetables have been brought to perfection in the vicinity of Calcutta through the stimulating influence of medals, and rewards from this Society, it is expedient to withdraw further encouragement from such as may not with safety be left to the profits of industry derivable from local consumption, and limited in favor of artichokes, asparagus, seakale, celery, parsnips and a few others that have not been brought to sufficient perfection to tempt uninterrupted cultivation for the market.

2nd.—That the medals and rewards thus taken from vegetables be enhanced (with reference to the more expensive cultivation) and applied to *fruits*, hitherto neglected, there being little doubt that with care and attention, grapes, oranges, apples, strawberries and other

delicious fruits may be brought to perfection in Bengal and indige-
nous fruits greatly improved.

3rd.—That with a view to secure such a desideratum parties having
approved stocks be invited to contribute grafts (or to sell them to the
Society) who will undertake to keep up a Nursery for the distribu-
tion of young fruit trees.

4th.—That the sum of 500 rupees be annually set apart and laid
out in the importation of fruit trees, from the Cape, America, New
South Wales and Europe.

5th.—That Government be solicited to authorize the Superintendent
of the Botanical Garden at Saharumpore to send down grafts of
fruit trees and shrubs, and that the expense of transmission be borne
by the Society.

6th.—That two of the Society's *ordinary* silver medals, and fifty
rupees be placed at the disposal of each of the following Branch So-
cieties, for the purpose of encouraging the Natives to cultivate Eu-
ropean vegetables as successfully as they are now established round
about Calcutta, viz.

Hoogly, Burdwan, Beerbhoom, Midnapore, Cuttack, Comillah,
Moorshedabad, Azimghur, and Assam.

7th.—That a limited shew of *particular* vegetables shall be held
in reference to the season of their coming to perfection.

That a shew of fruits shall be held annually in due season, and
rewards given.

Motion, No. 2. The Secretary brought to the notice of the meet-
ing, that the great increase of new Members, had exhausted the
stock of the Societies' Transactions, vols. 2 and 3, and that there
were not many of the reprint of vol. 1, remaining.

Proposed by C. K. Robison, Esq., seconded by W. Storm, Esq.,
that the 1st, 2nd and 3rd volumes, be put into a second edition, and
that the expense be ascertained and brought to the notice of the Soci-
ety at its next general meeting.

The Secretary brought to the notice of the meeting several samples
of raw silk and one sample of sugar, sent in by parties agreeable to a
resolution of the Society passed on the 12th April, 1837, to compete
for the Society's medals.

The Secretary was directed to hand over these samples to the re-
spective Standing Committees, upon whose Reports the medals would
be adjudged at the next general meeting.

REPORTS.

Read, the Agricultural Committee's Report,—on the subject of the distribution of sugar-canes at the end of the year, concerning which an advertisement has already appeared in the public prints.

Read the report of the Silk Committee on certain specimens of raw silk and cloth ; produced from the wild silk worm in Assam, Bhaugulpore, Dinagepore and Bancoorah.—Referred to the Committee of papers.

COMMUNICATIONS.

Read the following communications :—

Read a letter from Mr. Robert Smith to the Secretary, dated 11th April, requesting to be supplied with as much caoutchouc, as the Society can spare, and offering to pay for the same at the rate of eighteen rupees per maund.

The Secretary had submitted Mr. Smith's letter to the Committee, who were unanimous that Mr. Smith should have what was available gratis. Resolved accordingly.

Read a letter from Mr. Robert Smith to Dr. Wallich, dated 7th May, submitting for the inspection and opinion of the Society some samples of caoutchouc cloth, which he had prepared as a substitute for wax-cloth for packing purposes.

From Lieut.-Col. Dunlop, dated Simlah, March 25th, to the Secretary, advising the despatch for presentation to the Society, of a parcel containing seeds of all varieties of Hill forest trees, and several kinds of pine-cones which may be considered valuable for transmission to Europe and other cold countries, giving information respecting the description of vines grown at Koomawur, and promising to forward cuttings.

From Messrs. Willis and Earle, dated 12th April, presenting to the Society, on behalf of Mr. Jeffries Finch, 4 specimens of apples grown in that gentleman's garden at Shalepore, Tirhoot, from English grafts.

1 Apple, weight	25	Sa. Wt. measured in circum.	11 inches.
1 Ditto	" 21 $\frac{1}{4}$	" "	10 $\frac{1}{2}$
1 Ditto	" 15	" "	9 $\frac{1}{2}$
1 Ditto	" 12 $\frac{1}{2}$	" "	8 $\frac{3}{4}$

These beautiful apples were received by the Secretary, on the day after the last General Meeting, and fearing the apples might not keep, he circulated them as widely as possible. The fruit was equal to any at home, both in appearance and flavour, but Mr. Finch does not state whether these were solitary specimens, or whether the tree or trees bore much fruit.

From C. K. Robison, Esq. dated 14th April, enclosing extract of a letter from Major Lawrence, dated Dorunda, near Hazareebaug, 3rd March, forwarding a small quantity of vegetable marrow seed.

From T. Sandys, Esq., (without date,) received 15th April, acknowledging receipt of Secretary's letter of the 16th January, together with copy of the Committee's Report on his model, No. 2, of a machine for raising water, and offering a few observations in reply.

From Captain Macfarquhar, to the Secretary, dated Tavoy, February 21st, forwarding for presentation to the Society, specimens of caoutchouc, dammer varnish and cotton.

Stating that the former has been manufactured under his superintendance, and that abundance of the gum can be procured in those provinces. That the sample of dammer varnish is made by bees on the same tree from which the rosin is procured, and that the cotton is the produce of his garden from seed raised from Sea Island, and which seems to thrive well in that neighbourhood.

From the Rev. Mr. Thomas, superintendant of the Baptist Mission Press, intimating that he will print the transactions on the same terms as proposed by the College Press.

From Colonel Stacy, dated 15th April, enclosing a sample of cotton and requesting an opinion on its quality.

From R. S. Homfray, Esq., dated 18th April, presenting an apricot produced in his garden at Barripore.

The members of the Agricultural Committee had tasted this apricot. Its fragrance was very fine, but it was sour to the taste.

From Captain P. Torckler, dated April 19th, acknowledging the receipt of transactions, and stating the intention of the Mess Committee to agitate the question of establishing a Branch Society at Dum-Dum.

From Dr. A. Campbell, dated Nipal, 12th April, conveying further information on the subject of his former proposition of acclimating seeds in Nipal for transmission to the plains.

From C. H. Blake, Esq., dated —, received 21st April, forwarding a bag containing two maunds of sugar to compete for the gold medal offered by the Society for the best sample of "Muscovado."

From Captain Jenkins, dated 12th April, conveying information on the subject of Eria silk.

From E. Macintosh, Esq., of Purneah, dated 16th April, in reply to Secretary's letter of the 2nd idem, on the subject of Indian cattle. Promises to give such information as his experience may admit.

From Mr. L. L. Leman, of St. Helena, dated 12th December, 1837, offering to become the Society's Agent in London for the purchase of cotton seed, &c.

From Dr. A. Campbell, dated 15th April, on the subject of correspondence respecting Nipal paper published in vol 5, Transactions of the Society.

From Major J. D. Parsons, dated Cawnpore, 16th April, promising, in reply to Secretary's letter of the 2nd idem, to give some additional information on the subject of Indian cattle.

From R. Montgomery, Esq., dated Allahabad, April 18, asking for a supply of cotton seeds for distribution in the district.

From M. G. Rose, Esq., of Ramunaghur Factory, via Coolbariah, forwarding a box containing samples of raw silk to compete for the medals offered by the Society.

From William Storm, Esq., dated 30th April, forwarding samples of silk, to compete for the medals, prepared by Mr. A. McArthur at the Bamundee concern, in zillah Nuddeah.

From N. Alexander, Esq., dated 26th April, enclosing a memo. of the mode adopted by him in rearing artichokes.

From the Secretary to the Meerut Society, dated 18th April, advising the despatch of some samples of wool for the opinion of the Committee. Acknowledges receipt of the Secretary's letter, with copies of the cattle committee's pamphlet.

From W. Storm, Esq., dated 8th May, forwarding some wool taken from English imported sheep.

From H. C. Hulse, Esq., dated Muttra, March 20th, forwarding four samples of wool, viz., 2 of white, 1 of grey and 1 of black, shorn from Merino sheep reared under his care and conveying some information on the subject.

From the same, dated Muttra, 6th April, transmitting for the inspection of the Society samples of grass and grass atta, procured in that part of the country; stating that these varieties of grasses are the present means of subsistence to a large portion of the natives of that district, and that the fact of their being made use of as food appears to be but little known, even to parties long resident in India.

From the same, dated 10th April, acknowledges receipt of Secretary's letter in reply to his communication, on the subject of a horse-breeding establishment, &c.

From Dr. J. T. Pearson, dated Juanpore, 23rd April, acknowledges receipt of Secretary's letter of the 16th ultimo, returning his communication on cochineal.

From W. Cobb Hurry, Esq., dated 30th April, presenting an ear of Pennsylvania maize.

From Mr. Hugon, dated 4th April, Kedgerree, acknowledging receipt of parcels of books, &c., intended for the Agricultural Society of Mauritius.

From Mr. A. Millett, no date, received 8th May, forwarding 12 musk-melons, of the same description as those presented last year.

From Captain G. C. Dixon, dated Mhairwarrah, 22nd April, advising despatch of a quantity of Lucerne Seed, for presentation to the Society, and intimating his willingness to forward a further supply at the close of the rains; stating his intention of sowing a large tract of land with cotton seed and maize, the produce of seed furnished by this Society.

From the Reverend J. Parry, dated Jessore, 17th April, presenting to the Society, about half a maund of Sandoway tobacco, and a quantity of Madras tobacco, grown in that district from seed, supplied by this Society to Mr. Cathcart, also a specimen of the soil. Requests an opinion on these samples, and information on the culture and preparation of the plant; stating that he has collected a large quantity of seed from both varieties for distribution in the district.

From Major Syers, Secretary Agricultural Society of Cuttack, dated 4th May, advising despatch of samples of Virginia tobacco and Upland Georgia cotton, produced in the Society's garden at that station from seed furnished by this Society.

From F. Macnaghten, Esq., Government Agent, dated 2nd May, enclosing account current up to the 30th April, 1838, showing the sum of 19,900 rupees, to be lodged in Government Securities on account of the Society.

From M. G. Maxwell, Esq., M. D. of the Madras Establishment, dated 9th May, asking for the coloured drawings of tobacco plants, presented by that gentleman to the Society sometime ago, if not required, for the purpose of being forwarded to Dr. Wight of Madras.

Dr. Maxwell also gives some useful hints as to the manner of preserving seeds from insects.

Some fine parsnips were submitted by Mr. Kirchhoffer, the produce of his garden at Ballygunge.

Dr. Wallich submitted a small squash grown by Mr. R. Smith from English seed.

The thanks of the Society were ordered to be offered for all the above communications and presentations.

JOHN BELL,

Town Hall, Calcutta, May 9, 1838.

Secretary.

PROCEEDINGS OF THE AGRICULTURAL COMMITTEE.

A Meeting of the Agricultural Committee was held at the residence of Dr. Wallich, Honorable Company's Botanical Garden, on Thursday evening, 19th April, 1838.

Present.

Dr. Wallich.

Thomas Leach, Esq.

W. Storm, Esq.

W. F. Gibbon, Esq.

John Bell, Esq.

The Committee report that the late showers have done much good. The canes lately planted have all come up, and present one continued superficies of healthy-looking plants.

A large portion of new land has been put under the hoe, and is now ready for the reception of plants.

Resolved,—That all the remaining stock of Bombay, &c. cane be immediately cut and planted out in the land prepared, and also that the Singapore canes be applied in the same, saving one or two Ratoon plants which are recommended to remain to determine the size and variety of cane.

Resolved,—That it appearing to the Committee judicious to advertize for distribution the Otaheite and other cane in the Society's Nursery, in order to give all parties at a distance due notice that they may prepare their land, and have their supplies in time. It is proposed to issue an advertisement to the following effect.

Otaheite, Singapore, and China Sugar-canes, for distribution.

1. Sugar-cane cuttings will be distributed between the 1st December, 1838, and the 1st February, 1839.

2. Applicants to send in their names to the Secretary from the date of the notice to the 1st October next, after which no applications will be registered.

3. Applicants to state the number of beeghas they desire to cultivate, and to send their own servants to receive their quotas at the Society's Nursery in H. C. Botanic Garden.

4. The applications of Members to be first complied with *gratis*.

5. Each Branch Society to be supplied with a certain quantity if applied for within the prescribed period, and on furnishing the Secretary with the names of parties requiring canes.

6. When Members and Branch Societies shall have been supplied, and if any surplus remains, the Committee will distribute them to other parties on the payment of eight rupees per hundred full length canes.

7. Members who apply, are expected to state distinctly that the canes are for their own *bond fide* use, and if not, for whom they are intended.

8. The Society cannot undertake to despatch canes to applicants.

9. *Resolved*,—That the Secretary be directed to give publicity to the above notice at once, and that it be repeated at least twice monthly until the 1st October next. The Committee have determined to keep on the extra hands that have been employed during the last month, in order that the Nursery may have the benefit of irrigation during the present hot weather.

Two apples grown by Mr. J. Finch of Tirhoot, were submitted; and the Committee are happy to report that in point of size, perfection and flavor, they equalled the finest fruit of the same kind in England. An apricot grown in Mr. Homfray's Garden at Barripore, (the tree bore 3 fruit) was also submitted; the fragrance was exquisite, but the fruit was very acid.

(Signed)

CHARLES HUFFNAGLE.
N. WALLICH.
THOMAS LEACH.
WM. F. GIBBON.
WM. STORM.
JOHN BELL.

JUNE 13, 1838.

Agricultural Society of India.

A General Meeting of this Society was held in the Town Hall.

Present.

The Hon'ble Sir E. Ryan, President, in the chair.

Dr. Wallich, V. P. Dr. Spry, Col. M. Leod, Messrs. W. Storm, C. K. Robison, V. P. J. Guilding, R. Watson, A. Grant, A. Colvin, W. Aihslie, W. Earle, Jos. Willis, G. A. Prinsep, E. Preston, F. T. Fergusson, W. F. Fergusson, A. Porteous, Thos. Bracken, M. S. Staunton, W. K. Ewart, C. Dearie, Dwarkanath Tagore, Ramcomul Sen, R. Walker, C. A. Dyce, D. Hare, J. Allan, W. Mackenzie, H. Cowie, D. W. H. Speed, G. T. F. Speed, J. W. Masters, A. McArthur, Thos. Leach, and John Bell, Secretary.

The proceedings of last meeting were read and confirmed. After an alteration had been made by the President, on Dr. Spry's suggestion, viz.

In Motion No. 1. of last meeting, for the words 'Dr. Spry, moved as an amendment,' read 'Mr. G. A. Prinsep, moved as an amendment.'

The following gentlemen, proposed at the May meeting, were duly elected members of this Society, viz.

Capt. H. Macfarquhar, Dr. Jas. Hutchinson, Thomas Savi, E. Mackintosh, G. T. Cockburn, G. G. MacIntosh, C. S., F. Kirchhoffer, C. M. Hunter and G. Austin, Esquires, Rajah Nursingchunder Roy and Baboo Keenut Singh.

The following gentlemen were proposed as members, viz.

<i>Names.</i>	<i>Proposed by</i>	<i>Seconded by</i>
Major H. Cox, 58th Regt. N. I.	Dr. Wallich,	}
Henry Freeth, Esq. Nowgong.	Capt. Jenkins.	
H. J. Leighton and Colin Campbell, Esqs. Brigadier General Sir Thomas Anbury, K. C. B.	W. F. Fergusson, Esq.	} The Secretary.
W. R. Logan, Esq. My- munsing and Baboo Peary Mohun Day.	F. T. Fergusson, Esq. D. Hare, Esq.	
W. F. Dowson, Esq. Major J. D. Parsons, Col. L. R. Stacey, 32nd N. I.	John Allan, Esq. • } The Secretary,	A Grant, Esq. and Dewan Ramcomul Sen. W. Storm, Esq. Dr. Wallich.

Motions of which notice was given at last meeting.

No. 1.—By the Secretary, seconded by W. Storm, Esq. was brought forward, and carried *nem. con.*

No. 2.—By C. K. Robison, Esq. seconded by W. Storm, Esq. was next brought forward, and carried *nem. con.*

NOTICE OF MOTION.

Proposed by G. A. Prinsep, Esq. seconded by C. K. Robison, Esq. 'That the sum of 500 Rupees be appropriated for procuring cotton seed of every variety in estimation from South America, and that a correspondence be opened with Rio Janeiro, for the purpose of obtaining it.'

REPORTS.

The President drew the attention of the meeting to the subject matter of motion No. 1 of April meeting, which was brought forward at the last meeting, and carried by an amendment on the original motion, being at the same time referred to the General Committee for consideration. He, (the President) would read the report of that Committee, drawn up at a meeting held on the 9th instant, as follows :—

'The Committee having given the subject of reference to them their best consideration, are of opinion, that upon the account of the state of the funds laid before them by the Secretary, the means of the Society at present are inadequate to admit of its offering any sufficient rewards for the four practical treatises on cereal grains, sugar, silk, and cotton, and the Committee have therefore abstained from entering into further details, conceiving that the general operations of the Society will be endangered, if the present ascertained surplus be applied to these purposes.'

(Signed) E. RYAN.
C. K. ROBISON.
F. P. STRONG.
W. STORM.
D. HARE.
JOS. WILLIS.
JOHN BELL.

Proposed by G. A. Prinsep, Esq., seconded by W. Earle, Esq., that the above report be confirmed:—carried *nem. con.*

The President read the report of the Silk Committee on three samples of yellow and white raw silk, sent in for competition, with reference to the prizes offered by a resolution passed at a general meeting of the Society, held on the 12th April, 1837.

The Committee are of opinion, that the samples submitted by Mr. W. G. Rose, of Ramnaghur factory, near Coolbariah, are the best, and entitle that gentleman to the Society's gold medal.

That the sample of yellow silk sent in by Mr. Lay, superintendent of Mr. Larruleta's filatures at Jungypore, is the second best, and entitles that gentleman to the Society's silver medal.

Moved by C. K. Robison, Esq., seconded by the Secretary, that the Silk Committee's report be confirmed:—carried.

The President read the Sugar Committee's report on a sample of sugar submitted by Mr. Blake of Dhoba, who was the only competitor for the prizes awardable under the same resolution as those for silk.

The Committee are of opinion that the sample before them does not come within the meaning of the Society's intentions as expressed in the printed conditions; the sugar in question having been made from goor by a double process, and not by a single boiling, as practised in the West Indies, &c.

The Committee recommend that the premiums shall be open to competition till the 1st May, 1839, and that a specific advertisement be published and transmitted to all known cultivators.

Moved by C. K. Robison, Esq., seconded by G. T. F. Speed, Esq., that the Committee's report be confirmed:—carried.

The following communications were submitted to the notice of the meeting.

From H. Piddington, Esq., dated May 10th, enclosing copy of a letter written by him to Colonel James Young in February, 1831, on the subject of *cake* cochineal, prepared from the sylvestre insect.

From J. Guilding, Esq., dated May 23rd, forwarding a sample of *cake* cochineal, made by him from the sylvestre insect, abounding in Midnapore, and asking for an opinion upon its quality, &c.

From Professor O'Shaughnessy, dated May 31st, giving his opinion on the cochineal paste prepared by Mr. Guilding. Having submitted it to chemical test, the Professor speaks in very favorable terms of this dye: 'This I think completes the proof that between the *fin*

and *sylvestre* insects, there exists at least no chemical difference.' The conclusions at which Mr. Piddington and Professor O'Shaughnessy arrive are very similar—the only difficulty appearing to be in obtaining a complete absorption of all moisture from the paste, immediately after the process of manufacture.

(Referred to the Cochineal Committee.)

From Major W. H. Sleeman, dated Jubbulpore, May 7th, conveying much interesting information on the mode of cultivating the lac insect.

(Referred to the Committee of Papers.)

From the Rev. C. E. Driberg, dated May 9th, annexing a paper on the 'culture of the cocoanut tree in Ceylon,' received from a friend on that island.

(Referred to the Committee of Papers.)

From Col. Dunlop, a parcel containing varieties of hill forest trees, referred to in his letter to the Secretary of the 25th March.

From G. H. Smith, Esq., dated Delhi, May 8, promising to forward shortly samples of cotton of the 1st and 2nd year's crops, raised from Upland Georgia seed.

Gives a favorable account of an experimental plantation of Otaheite sugar-cane in Deyrah Dhoon.

From the same, dated May 18, forwarding, for the opinion of the Committee, samples of Upland Georgia and Sea Island cotton, the produce of his garden at the station, as alluded to in his former letter of the 8th.

From R. Lowther, Esq., dated Allahabad, May 20, advising despatch of two cases containing samples of the produce of four varieties of cotton seed, forwarded by the Society for distribution in that and the neighbouring districts.

Enclosing a memo. received from Mr. Lambert, regarding these samples.

From Dr. Huffnagle, dated May 30, forwarding a bale of cotton, being a portion of the second crop produced from 400 plants grown at Cossipore, raised from Upland Georgia seed, imported by the Society in 1836.

Suggesting that the bale of cotton be sent to England for a competent opinion as to quality. Forwarding also two bottles of oil expressed from the seed of this cotton.

From T. O. Crane, Esq., Secretary Agricultural Society of Singa-

pore, dated May 11, acknowledging receipt of Secretary's letter of the 17th March, together with the Seychelles cotton seed and Transactions of the Society, vol. 5.

Enclosing a small sample and a few seeds of a description of cotton resembling Sea-Island.

From Major Syers, Secretary to the Agricultural Society of Cuttack, presenting samples of Upland Georgia cotton and Virginia tobacco, grown in that district from seed received from the Society referred to in his letter of the 4th May.

Note.—All these samples of cotton ordered to be referred to Committee for Report.

From Mr. A. Harris, dated 24th May, forwarding 3 cuttings of cane, (variety unknown, but resembling the China cane,) together with a large cane ratooned from the small stock.

Mr. Harris states, that the original cuttings from which these 3 average canes were produced, did not exceed the thickness of a common ratan, shewing a vast improvement on the plant canes; but the most extraordinary improvement is upon the *ratoon*, which is nearly four times the thickness of the plant or parent stock,—a fact which is at variance with the course of ratooning in general;—since ratoons are invariably smaller, and can only be accounted for, in the extraordinary fertility of the Soonderbund soil, and holds out fair prospect of ultimate remuneration to those grantees, who are now laboring to convert a rank pestilential morass, into a highly cultivated sugar country.

A full length sugar-cane was submitted, said to be produced in the Island of Ceylon by Mr. Henley, from Mauritius plant,—of *four months' growth*.

From A. Harris, Esq., dated May 28, offering a few remarks on a trial made with a plough recently received by the society, made at the Porto Novo Foundry from an American model.

From Major J. A. Moore, dated Hydrabad, May 18, advising despatch of three apples of the nonpareil species, grown in a friend's garden a few miles from the station.

From Colonel Stacy, dated Dacca, May 20, forwarding a bag containing the roots of a plant common in that part of the country, called 'suth moolee,' or the 60 radishes, also a few pods of a climber termed 'tiel'h gulah.'

From Captain Cautley, dated Saharunpore, May 11, advising the

despatch of a quantity of bansmutti seed rice, which he presents to the Society.

From Dr. W. Montgomerie, dated Singapore, April 23, acknowledging the receipt of Secretary's letter of the 17th March, intimating a resolution of the Society for awarding him a silver medal.

In reply, Dr. Montgomerie returns his best thanks to the Society for this mark of its approbation, but regrets that 'circumstances should render it necessary to decline the intended honor.'

From Signor G. Mutti, dated Kootroor Bagh, Poonah, 7th May, acknowledging receipt of Secretary's letter of April 15, and returns his best thanks to the Society for the resolution therein conveyed, of awarding him the Society's gold medal.

Promises to afford further information to the Society on the cultivation of the standard mulberry tree, &c.

From Major Parsons, dated Cawnpore, May 4, acknowledging receipt of Secretary's letter, intimating despatch of cotton seed.

Mentions having raised a quantity of fine guinea grass from seed forwarded by the society in 1836.

From Major Gwatkin, dated Coel, May 2, acknowledges receipt of Cattle Committee's pamphlet, but regrets his inability to give any information on the subject in question.

Advises despatch of sample of 4 growings of oats, and promises to send seed of the '*Prangos*,' if successful in raising plants from a few seeds lately received.

States that the guinea grass seed has vegetated, and alludes to trials made with the French oat seed and Italian rye-grass seed received from the Society.

From Captain Jenkins, dated Gowhatti, May 13, advising despatch of two parcels of fresh cocoons.

From W. Prinsep, Esq., dated May 19, reporting on musters of raw silk forwarded by the Committee, for his opinion as to the market price.

From James Anderson, Esq. M. D., Secretary to the Agricultural Society of Beerbhoom, dated June 5, giving cover to a copy of the proceedings of a late meeting of the Branch Society, and calling the attention of the parent institution to a few of the resolutions contained therein; viz. for the supply of sugar-cane, fruit trees, seeds, &c. Encloses also a copy of the proceedings of their society since its formation up to the present time.

From W. Rushton, Esq., dated May 12, offering to print the transactions of the Society on the same terms as the Bishop's College or Baptist Mission Press.

Memo.—The question had been settled before the receipt of Mr. Rushton's letter, and the 6th volume is now printing at the Baptist Mission Press.

The Madras Journal of Literature and Science, from January 1837 to March 1838, 5 numbers had been received through Messrs. Thacker and Co.

From Captain F. Jenkins, dated Gowhatti, May 31, intimating his intention of forwarding by a different mode to that hitherto pursued, which has proved unsuccessful, some eggs of the Eria worm to try if by this means they can be received in a living state.

From James Anderson, Esq., M. D., Secretary, Agricultural Society, Beerbhoom, forwarding the samples of cotton alluded to in his letter of the 5th instant.

From Miss Peacock, a pod of a large species of tamarind, the produce of Mhow.

Dr. Wallich stated, that it was not a tamarind, but the *Adamsonia digitata* or boobab of the west coast of Africa. It is also called monkey bread. *

From Dr. Wallich, dated June 13, annexing extract of a letter from Mrs. Captain Milner, presenting a basket of beautiful and perfect bunches of purple and white grapes, with some interesting details as to the mode adopted by that lady in treating the vines. Proposed by the President, seconded by the Meeting, that the special thanks of the Society be offered to Mrs. Milner, for her highly interesting and beautiful present, which clearly proves that nothing but taste and attention is wanting, to secure as fine grapes and as plentiful *in and about* Calcutta, as in the finest wine countries.

Memo.—The Secretary had also received within the last week, a splendid bunch of grapes from Col. James Young, the produce of the vine planted by C. K. Robison, Esq. in the Union Bank compound, and a bunch from Mrs. Smith, the produce of her garden in Short's Bazar. If every householder in Calcutta would plant but two vines, he would secure at once a cool retreat, and delicious fruit by simply planting cuttings in a soorkey corner.

Mr. George Prinsep presented a fine specimen of cotton, grown from *Peruvian* seed, valued by Mr. Willis at 50 per cent. more than

Surat. It has the advantage of black seed, which are easily detached.

Mr. Masters presented a fine graft of the ficus elastica, of 48 days' growth, 10 feet in length and 6 inches in circumference.

Mr. G. T. F. Speed presented a specimen of hemp, from the purple hibiscus, grown at Patna.

The thanks of the Meeting were ordered to be given for all the above communications and presentations.

JOHN BELL, *Secretary.*

Town Hall, Calcutta, 13th June, 1838.

JULY 11, 1828.

Agricultural Society of India.

A General Meeting of this Society was held at the Town Hall.

Present.

The Hon'ble Sir E. Ryan, President, in the chair.

Dr. Wallich, V. P., Mr. C. K. Robison, V. P., Dr. Huffnagle, Mr. W. Storm, Dr. Strong, Messrs. G. A. Prinsep, A. Grant, G. F. McClintock, A. Colvin, E. Stirling, W. Ainslie, D. Hare, T. S. Kelsall, W. K. Ewart, C. Trebeck, W. F. Fergusson, R. Campbell, A. Harris, A. Porteous, E. S. Hodges, R. S. Strickland, John Jenkins, Thomas Bracken, and Thomas Leach, Baboo Cossinauth Bose, Messrs. H. Cowie, James Church, G. T. F. Speed, and John Bell.

Visitor.—Colin Campbell, Esq.

The proceedings of last meeting were read and confirmed.

The following gentlemen proposed at the June meeting, were duly ballotted for and elected members of this Society, viz.

Major H. Cox, H. Freeth, Esq., H. J. Leighton, Esq., Colin Campbell, Esq., Brigadier General Sir Thomas Anbury, K. C. B., W. R. Logan, Esq., Baboo Peary Mohun Day, W. F. Dowson, Esq., Major J. D. Pearson, and Col. L. R. Stacy.

The following gentlemen were proposed as members, viz. :

Jeffrey Finch, Esq., of Tirhoot, proposed by the Secretary, and seconded by W. Storm, Esq.

Col. G. W. A. Lloyd, Darjeeling, proposed by the Secretary, and seconded by Dr. Wallich.

Capt. C. Dallas, Artillery, proposed by Capt. H. J. Wood, and seconded by the Secretary.

W. Bell, Esq., C. S. proposed by W. Cracroft, Esq., and seconded by the Secretary.

Alexander Holmes, Esq., proposed by G. A. Prinsep, Esq., and seconded by the Secretary.

D. E. Shuttleworth, Esq., proposed by Thos. Leach, Esq., and seconded by W. W. Kettlewell, Esq.

J. D. Herklots, Esq., proposed by Charles Huffnagle, Esq., and seconded by W. Storm, Esq.

George Barton, Esq., Coolbariah, proposed by W. Storm, Esq., and seconded by James Crooke, Esq.

Dr. McCosh, proposed by Dr. Strong, and seconded by C. Trebeck, Esq.

Motion of which notice was given at last meeting :—

‘ The motion by G. A. Prinsep, Esq., seconded by C. K. Robison, Esq., to appropriate the sum of 500 Rs. for procuring cotton seed from South America, was brought forward and discussed, upon which, Mr Prinsep requested to withdraw his motion, in favor of another upon a more extended scale.’

NOTICE OF MOTION.

Proposed by G. A. Prinsep, Esq., seconded by C. K. Robison, Esq.—‘ That the sum of One Thousand Rupees annually be set apart for procuring cotton seed, (of every variety of cotton in estimation) from South America, the Western Coast of Africa, China, Manilla, and all places capable of affording good cotton seed not already resorted to by the Society for that object.’

REPORTS.

Read the report of the Caoutchouc and Oil Seed's Committee on certain specimens of caoutchouc and dammer varnish, grass and grass otta, submitted for their opinion.

Ordered to be made over to the Committee of Papers.

Read the report of the Agricultural Committee on the state of the sugar-cane plantation, in the Society's Nursery, at a meeting held at the residence of Dr. Wallich on the 28th June, 1838.

The following communications were read:—

From Brigadier General Sir Thomas Anbury, dated Saugor, Nerbudda Territory, June 28th, acknowledging the receipt of the Secretary's letter of the 15th June, on the subject of Mr. Alexander's melon produced from seed presented to the Society, last year by Sir Thomas: mentions, that this has been an unfavorable season for melons at Saugor, but encloses part of the rind of one produced in his garden, 27 inches in circumference. Promises to send down some more seeds from the same description of melon, and forwards a few seeds of the simool cotton.

Two very large and well flavored pomegranates were presented, through the Secretary by Mr. Gregory who grew them at Chinsurah, and promised to send a memorandum, which however has not been received.

A packet of tobacco seeds of sorts, and samples of three varieties of tobacco, grown in the Branch Society's garden at Burdwan, was presented by Dr. Cheek.

From Jeffrey Finch, Esq., dated Tirhoot, 5th June, acknowledging receipt of Secretary's letter of the 18th idem, regarding the sample apples presented by him to the Society, and with reference to the request conveyed therein, encloses a memorandum detailing the mode adopted by him in the cultivation of his apple trees.

From N. Alexander, Esq., dated June 14th, forwarding a melon grown in his garden from seed presented to the Society by Sir Thomas Anbury, the weight of which was 5lbs., and its circumference 24 inches.

Memo.—This melon was sent a day too late to be presented at the last meeting of the Society, but it was acknowledged by those who saw it, to be the finest specimen of a melon they had seen in Bengal, and in flavor exquisite.

From M. Crow, Esq., dated 22nd June, forwarding a bunch of purple grapes produced at Serampore in the garden attached to the vicarage, under the Rev. Mr. DeMello. The bunch weighed 22½ sicca weight, and was of fine flavor, but the fruit was so thickly set together, that the grapes were squeezed into all manner of shapes. Had

the method successfully adopted by Mrs. Milner been known, the appearance and size of the Vicar's grapes would have been very different.

From Dr. Wallich, dated June 21st, enclosing a letter to his address from Captain Jenkins, dated June 13th, forwarding a sample of Mishmes wool.

From Dr. Wallich, dated June 21st, annexing postscript of a letter to his address from the Rev. C. E. Driberg, tendering his services to the Society, to translate its Transactions into the Bengali language.

From M. McLean, Esq., dated June 23rd, forwarding on the part of J. Balestier, Esq., American Consul at Singapore, two bundles of sugar-cane, and a sample of raw sugar, entrusted to his care.

From J. Balestier, Esq., dated Singapore, March 20th, presenting to the Society, as specimens of the produce of his plantation, two varieties of cane, green and yellow, also a small sample of raw sugar.

Mr. Balestier denominates the green, the 'Salangore cane,' and the yellow, he thinks is the Otaheite cane. He solicits the indulgence of the Society to the sample of sugar alluded to, (the first ever made in the island,) as having been manufactured in a hasty manner and with imperfect materials, and promises hercafter to give the Society the result of his labors.

Note by the Secretary.—The canes were received and sent over to the Society's Nursery, but Mr. Masters reports them all dead. They were very fine specimens as to size; averaging 10 feet in length, and some of them 8 inches in circumference. The sugar was in a very small pot, had been exposed to the sea air, and the molasses had not been drawn from it, consequently it was in a high state of fermentation.

From the Superintendent of the Baptist Mission Press, dated June 23rd, intimating his willingness to undertake the reprint of the Transactions, vols. 1, 2 and 3, (300 copies of each,) at the rate of 1-14 per page, amounting in the aggregate to 1,732 rupees.

Memo.—The 1st volume is now in the press.

From Mr. C. N. Villet, dated Cape Town, May 11th, giving cover to invoice and bill of lading for six cases of vegetable and flower seeds, shipped on board the *Abberton*, for the use of the Society,

amounting to sicca rupees 1,390, for which he has drawn on the Society at 30 days' sight.

From J. Tennant, Esq., dated Cape Town, 3rd May, advising despatch per *Abberton*, of a parcel of seeds forwarded on the part of Dr. A. R. Jackson.

Note.—All these seeds have arrived in excellent order and condition, and are now under distribution.

From T. W. Wilson, Esq., M. D., Secretary Agricultural Society of Comillah, dated 23rd June, in reply to Secretary's letter of the 15th idem, respecting the offer of rewards and medals by this Society, to encourage the introduction of European vegetables in that district, states it as the opinion of their Committee, that the amount would be better awarded (by *pecuniary* rewards only), to stimulate the growth of tobacco, grasses, sugar-cane, &c. superior to what are already grown.

It was resolved by the meeting, to refer the matter of Dr. Wilson's communication to Mr. Bell as the proposer, and Mr. Storm as seconder of the motion, for any suggestions they may have to offer on the point alluded to.

From James Colquhoun, Esq., dated 11th July, presenting a sample bunch of Guinea grass, grown in his garden; the height of this grass is *eight feet*.

From James Pontet, Esq., through W. Storm, Esq., a bottle of *bamboo seed*, collected in the valley of Rajmahal.

From J. W. Laidly, Esq., Secretary to the Agricultural and Horticultural Society of Moorshedabad, dated July 6th, acknowledging receipt of Secretary's letter of the 15th ultimo, and returns the thanks of the Society for the offer therein conveyed, viz. the reward of 50 rupees and two silver medals, to encourage the culture of European vegetables in that neighbourhood.

Mentions despatch of four grafts from mango trees of a superior variety.

From Capt. C. Burnett, dated Beaur, June 9th, acknowledging receipt of Guinea grass and cotton seed, states that the former had vegetated freely.

Annexes receipt furnished by Capt. William Barnet, for preventing the ravages of white ants on sugar-cane.

From W. Dent, Esq., dated Arrah, June 21st, mentions having

imported two rams to compete for the Society's medal at the show fixed for the 1st February next.

Suggests a modification of the conditions under which medals are awardable for horned cattle, to the effect that on arrival the Committee shall report their opinion, so as to render the exhibition of the animals unnecessary in February.

Proposed by C. K. Robison, Esq., Vice President, (who was called to the chair on Sir Edward Ryan's departure,) and resolved by the meeting that, as the *cattle show* is calculated to throw an interest into the Society's proceedings, and Mr. Dent's suggested modification would lead to much confusion and inconvenience, it is not expedient to alter the conditions already published.

From J. P. Marcus, Esq., dated June 30th, presenting to the Society a maund of Bansmuttee seed paddy.

From Dr. W. Montgomery, dated Singapore, June 13th, returning with reference to his former letter of the 31st May, the silver medal awarded to that gentleman by this Society.

From H. T. Prinsep, Esq., Secretary to Government, General Department, dated June 27th, acknowledging receipt of Secretary's letter of the 23rd idem, conveying a request of the Society, respecting transmission of fruit trees, &c. from the Botanic Garden at Saharunpore.

In reply thereto, states that the application should have been addressed to the Governor General for the North Western Provinces.

From N. Stowell, Esq., Secretary to the Inland Steam Navigation Company, London, dated February 8th, requesting on the part of the Company to be furnished with replies to a list of queries respecting the facilities, &c. of the navigation of the rivers of India.

From E. B. Stevenson, Esq., dated Cottyam, June 2nd, requesting on the part of the Travancore Government to be supplied with copies of all the volumes of Transactions, past and future.

Resolved—That the Secretary do furnish a copy of this Society's Transactions gratuitously for the Government of Travancore.

From Mr. H. Mansell, dated June 5th, tendering his services to make models of agricultural implements for the Society.

From Monsieur Parquier, dated July 2nd, encloses copy of the *Cerneen* of the 14th April last, containing an article on the culture of beet root in America, &c.

From Dr. Wallich, dated July 7th, presenting in the name of Captain Jenkins, two articles received by that gentleman from Captain Hannay, viz. a sample of rosin called 'Mekai' by the Assamese and some 'Naga Cassia bark.'

From Major Sleeman, dated Jubbulpore, June 7th, gives cover to a paper on the subject of a blight which attacked the wheat and other crops in Central India, in the year 1831, and mentions the sad effects experienced by the inhabitants in 1833, owing to the consumption of this diseased grain.

From Wm. Dunbar, Esq., Assistant Surgeon, Khamghur Light Infantry, Dorunda, Chota Nagpore, dated June 30th, giving some account of a disease termed 'Goorgoora,' or 'Nahurora,' which had been very prevalent among the horned cattle in the neighbourhood, during the past hot season.

From Colonel W. G. A. Lloyd, dated Darjeeling, June 29th, in reply to Secretary's letter of the 21st June, offers his services in distributing among the inhabitants of that district, any variety of seeds that may be furnished to him by the Society. Gives some information respecting the seasons and capabilities of the country, which may be interesting to many who look forward to visit Darjeeling, and is accordingly printed for general information.

"I have just received your letter of the 21st instant and beg to assure you I shall be very happy to undertake the distribution among the Hill people of any seeds you may send me for that purpose. Last year a large supply was sent to Mr. Chapman by Dr. Wallich of American garden seeds, which were distributed to many of the natives and I believe highly appreciated, the varieties of cabbages in particular, and the potato is sufficiently valued, and when they become acquainted with the method of culture and time of sowing will, I have no doubt, become a staple article of food among them. The seasons here are quite the same as in England, with this variation that there is a kind of second spring after the conclusion of the rains: the very cold weather seldom occurring before Christmas, but you may have any climate you like: all the tropical fruits and vegetables will thrive lower down on the sides of the mountains, and by having two gardens one above and another lower down, a resident here might be supplied with all kinds of vegetables the whole year through; there is great room for improvement in the agricultural and horticultural proceedings of these hill people, which it will take some time to bring

about ; but still I am sanguine of its ultimately being effected. It may be interesting to the Society to know, that there are tracts of ground available, highly adapted to the culture of the *tea, coffee, sugar-cane, cotton, wheat, barley*, and most kinds of grain ; the turnip of these parts is well known as the *Bootan*. The present staples of trade are the cotton, which is very inferior at present, and the munjeet which grows wild. They have very fine Indian corn, wheat, barley, and red rice as well as white ; but scarcely cultivate sufficient for even their own consumption, depending on the jungles for yams, (of which a very fine kind grows wild,) roots, and various kinds of *sags*, (one of which is fern tops,) and as they eat almost indiscriminately, all animals, from the elephant to the grubs of hornets and bees, they are more independent of farinaceous food than any people I know ; they have very superior kinds of chillies and capsicums, cucumbers, water-melons, pumpkins, calivanses, mangoes, peaches, oranges and apples, are the only known fruits I have seen, but the people eat a great variety of fruits which are produced in the forests and are unknown to us ; the mango does not ripen till October in general, or late in September. I have also, I think, seen cherries, and I believe there are apricots and a small plum ; I think all the varieties of European fruits would thrive most admirably on some part or other of the mountains, and the superior kinds of pine apple, orange, and pumplenose might be introduced at the commencement of the ascent of the hills. At this place the garden seeds scarcely ripen ; I have now various kinds of cabbages which flowered in October last ; and the seed is not yet ripe ; about 500 feet lower on the mountain the case would have been very different, and I might have had the seed ripe in time to have sown this spring. You were kind enough to give Mr. Bruce some Guinea grass seed for me ; I sowed it here and it came up and flourished luxuriantly through the rains and afterwards, till the hoar frosts commenced, and was by them totally destroyed, yet I have had geraniums planted in the open ground and not at all sheltered, stand through all the hoar frosts and snow, and they are very healthy. But the greatest drawback here to gardening, of which I am very fond, is the annoyance of grubs, they eat up every tender plant, and I can find no method of ridding the ground of them ; the havoc they commit is most vexatious and if you could put me in the way of getting rid of them you would very much oblige me ; they attack every thing indiscriminately, the young potato plants, the cabbages, the peas, the

beans, the beet ; in short nothing escapes them, and I fear nothing but time and the continual working of the ground will get them out. Our gardening season commences here in April and ends in November ; one of the greatest desiderata here is some kind of grass that would stand the winter frosts, as all the indigenous ones, though they are very good in the rains and the moist, or mild weather become quite burnt up, brown and dried in winter. Lucerne, sainfoin, clover and the usual English meadow grasses would I think answer well. What is the famous prangoss of Thibet ? It must be procurable near this but is not known by the name. Can you get me any of the seed ? it would thrive I am sure."

" I shall be very glad to become a member of the Society, and am much obliged by your offer of proposing me, which I accept with pleasure, and beg to refer you to my agents, Messrs. Bruce, Shand and Co. for payment of the admission fee and quarterly subscription as it becomes due. I fear it is too late to do much this year in the introduction of new seeds, but if you will send me some I will do my best. I should like much to see an improvement in the cotton, the ground is very favourable, and it is the staple cultivation of the Meehis, a race of people who inhabit the forest tracts at the foot of the hills, and who do not cultivate any grain in consequence of being infested with wild elephants, hogs, deer, &c.; but these animals do not seem to touch the cotton, neither do I believe they would the coffee, for which the tract where the Meehis are seems to me well adapted."

" Any supplies of seeds you may be able to send I shall be anxious to receive as soon as possible, for the season is fast passing away, and I shall be happy in sending you seeds from hence as opportunities may offer and as far as my slender cultivation will admit. I shall be able to furnish you with some turnip seed, I think in a short time and perhaps some cabbage and nolo-cole hereafter. I have no doubt the supplies from hence will be plentiful, but it is a great point to procure the best *Europe* seed for sowing here ; that procured in the plains from some cause or other seldom gives good produce."

Memo.—The Secretary had sent to Messrs. Bruce, Shand and Co. some Cape vegetable seeds for distribution among the natives, also Cotton Seed.

From A. Harris, Esq., dated July 9th, forwarding some specimens of cane grown on the high lands in the Soonderbunds.

From R. W. Chew, Esq., dated July 9th, presenting a bunch of the Pesang gadang, or large plantain of the Straits. *

From Dr. Wallich, dated July, presenting on the part of Major Archer, a box containing a leaf of the cactus, with a few insects of the true *grana fina cochineal*. On receiving this box the Secretary found only six diminutive insects, and on subsequent closer examination, four of these were found to be dead. Major Archer states, that all the large insects were destroyed on board the *Cavendish Bentinck* by cockroaches, when he was too ill to look after them. †

Mr. George Prinsep, in allusion to the above interesting communication, drew the attention of the meeting to the following extract of a letter, dated London, March 7th, 1838.

‘As soon as a fitting opportunity can be found, for conveying some plants of the true Mexican cactus and real cochineal insects, they will be forwarded. I have arranged the matter with Anderson of the Chelsea Garden, who will provide the plants, and the insects can be had at Claremont.’

Mr. Prinsep added, that this extract is from the letter of a gentleman who had been much in South America, and had latterly devoted much attention to entomology.

A copy of the Journal of the Madras Literary Society, No. 19, was received and submitted.

Two copies of a Pamphlet received from the Agricultural Society at Bombay.

Mr. Bell presented a copy of his External Commerce of Bengal, 1836-37 and 1837-38.

The thanks of the Meeting were ordered to be offered for all communications of an interesting nature and presentations.

JOHN BELL, *Secretary*.

Town Hall, Calcutta, July 11, 1838.

AUGUST 8, 1838.

Agricultural Society of India.

A General Meeting of this Society was held at the Town Hall.

Present.

The Hon'ble Sir E. Ryan, President, in the chair.

Dr. Wallich, V. P.; Messrs. C. K. Robison, V. P., W. F. Fergusson, W. Cracroft, A. Grant, N. Alexander, J. P. Marcus, John Allan, D. Hare, F. T. Fergusson, W. Storm, A. Harris, W. F. Gibbon, T. S. Kelsall, and R. Campbell; Col. MacLeod; Capt. Pemberton; Dr. Strong; Dewan Ramcomul Sen; Messrs. T. Holroyd, A. Porteous, R. Watson, R. S. Strickland, W. K. Ewart, C. A. Dyce, E. Preston, F. Kirchoffer and W. Jackson; Captain W. Spiers; Messrs. Chas. Dearie and John Bell.

Visitor.—Alex. Greig, M. D., introduced by Mr. Allan.

The proceedings of last meeting were read and confirmed.

The following gentlemen proposed at the July meeting, were duly elected members of the Society, viz.

Jeffrey Finch, Esq.; W. Bell, Esq., C. S.; J. D. Herklots, Esq.; Colonel G. W. A. Lloyd; Alex. Holmes, Esq.; George Barton, Esq.; Captain C. Dallas; D. E. Shuttleworth, Esq.; Dr. McCosh.

The following gentlemen were proposed as members, viz.

E. Mackintosh, Esq., (Firm of Becher Mackintosh, and Co.) D. C. Low, Esq., proposed by William Storm, and seconded by the Secretary.

J. St. Pourçain, Esq., proposed by H. Piddington, Esq., and seconded by the Secretary.

G. Gibbon, Esq., proposed by W. F. Gibbon, Esq., and seconded by the Secretary.

G. H. Clarke, Esq. C. S., proposed by N. Alexander, Esq., and seconded by the Secretary.

C. R. Richardson, Esq. (Tirhoot), proposed by the Secretary and seconded by Dr. Wallich.

Motion of which notice was given at last meeting.

Mr. G. A. Prinsep's motion to set apart 1,000 rupees annually for cotton seed, the produce of places other than those already resorted to, was brought forward and after some discussion carried nem. con.

REPORTS.

The President brought to notice a second report drawn up by Mr. Bell, on the experiments which he had made with the Cochineal insect committed to his care by the Society, which would duly appear in print.

In connexion with this inquiry, the President read a letter from Monsieur Bedier to the Secretary, and from Monsieur Richard to Dr. Wallich, of which the following is the substance —

From Monsieur Bedier, late Governor of Chandernagore, dated Bourbon 16th June, acknowledging the receipt of Secretary's letter of the 16th February last, and with reference to the request therein conveyed, advises the despatch per French ship *Therence*, of a chest containing plants of the Castilian Nopal, with the Cochineal insect thereon.

Monsieur Bedier, in reply to the several points of inquiry put by the Secretary, informs the Society that the cochineal and cactus, upon which it is reared in the Botanic Garden at Bourbon, were originally introduced into the colony in October 1826, having been brought from *Cadix*, by a French ship of war, the *Elephant*,—by the desire of the French Government, and quotes the authority of the Count de Cheffautaine, in a discourse delivered on taking charge of the Government of Bourbon at that period,—that every precaution had been taken to have the *true* Nopal, and the *fine* Cochineal. He, (the Count de Cheffautaine) having been charged to take care of these precious objects, and introduce them into Bourbon*.

Monsieur Bedier answers the question put by the Secretary, as to the cause of its being confined to the Botanical Garden at Bourbon, thus—“ L' introduction de la Cochenille à Bourbon, n' a pas eu les resultats qu'on en esperait ; le pris du travail y eu trop elevé pour que cette industrie puisse y etre productive ; ensuite la regularité et la minutie des soins qu'elle exige, n' entrent pas dans les habitudes et l'esprit des petits creoles aux quils on la destinait.”

Monsieur Bedier quotes the authority of Menonville, Monsieur Perottet, naturalist to the French Government, now at Pondicherry,

* The Cochineal cultivated at Cadix, from which the Bourbon supply has been derived, had its origin in a chest of Castilian Nopal with the *grana fina*, presented to the Royal Economical Society of Cadix, by Don Ildefonso Rues del Real, to whom it was sent from Vera Cruz in 1820, by Don Pedro Josef Cuago, under special charge of Don Josef Martinet.—(Note by the Secretary.)

and Monsieur Richard, in favor of the Bourbon insect being the true *grana fina*;—all those authorities having had under their charge, both the *fina* and the *sylvestre*, and after a very careful examination, Monsieur Bedier adds his own conviction that the insect is the true *grana fina*.

• From Dr. Wallich, dated 4th August, enclosing extract of a letter from Monsieur Richard to his address, dated Bourbon 20th June 1838, on the subject of Cochineal. This gentleman says :

“ Since its arrival at Bourbon, this species has always been regarded in this country as the true fine Cochineal, and I frankly confess my opinion, I have been in the habit for several years of seeing the Cochineal called the Sylvestre. The very remarkable difference which exists between the two species, does not admit of a doubt upon its identity with the *grana fina*.”

The President with reference to these communications, drew attention to a resolution proposed by Dr. Wallich at a general meeting on the 13th September 1837, to offer the Society's gold medal for delivery at Calcutta of a fair proportion of the Cochineal Insect in a living and healthy state.

The Secretary informed the meeting that he had received the chest of Cactus and Cochineal alluded to in the letters of Messieurs Bedier and Richard by the French ship *Therence*, Captain Caillat; that the plants were very fine, although most of them were decaying at the root, and that they had very few insects upon them; that in concert with Dr. Wallich, whose opinion he had solicited, he had planted them out immediately on receipt, as the only means of saving them.

The President stated, that the evidence collected from various quarters, and especially from Bourbon, as to the source from whence the supply of cactus and insect was originally obtained, went far to establish it as the true *grana fina*, concerning which there had been an interesting controversy,—and thought as the former Committee appointed to investigate the question in dispute, had already considered as far as they could decide that the insects before them (those from Bourbon and the Cape), were as distinct as the *grana fina* of Commerce is described to be different from the “*grana sylvestra*”—it now became necessary to appoint a separate Committee, for the purpose of carefully perusing all that had been said on both sides, together with the fresh evidence of identity now submitted to the meeting, and to report their opinion to the Society.

The following gentlemen being requested to act as a Committee signified their assent, viz. C. K. Robison, V. P., W. Cracroft, W. F. Fergusson, W. K. Ewart, and D. Hare, Esqs. Mr. Hare consented to act as Secretary to the Committee.

Resolved accordingly, and that Mr. Bell be directed to make over to the New Committee all papers connected with the subject.

Two reports upon samples of cotton were submitted, viz.

No. 1. Report upon samples, the produce of Egyptian, Nankin, and South Sea Island seed, grown at Hazaureebaug, Meerut, Dacca and Tavoy, by Baboo Rajkissen Mookerjee,—the Society at Meerut, Colonel Stacey, and Captain Macfarquhar.

No. 2. Report upon samples, the produce of Upland Georgia, Sea Island, New Orleans, Peruvian and Arracan seed, grown at Delhi, Singapore, Cossipore, Beerbhoom, Allahabad, Akyab, Cuttack and Soonderbuns, by G. H. Smith, Esq., T. O. Crane, Esq., Dr. Huffnagle, the Beerbhoom Society, W. Lambert, Esq., Captain Bogle, the Cuttack Society, and G. A. Prinsep, Esq.

Report of the Cattle Committee on samples of various sorts of wool received within the last four months, was also brought forward.

Report of the Agricultural Committee on the subject of a fruit tree nursery and the state of the sugar-cane plantation. All these reports have been confirmed, and directed to be made over to the Committee of papers and acted upon.

The Secretary intimated to the meeting that of four hundred packets of vegetable seeds received from the Cape, upwards of 200 parcels had been already distributed to members, and but few applications yet received from the Mofussil. He wished to take the sense of the meeting, on the question of distributing any to mallies this season as heretofore, with reference to the increased number of members during the last year, who might still call upon the Society for their respective shares.

The Secretary farther stated, that he had sent some parcels of seeds to Colonel Lloyd at Dorjeling, and that Dr. Campbell of Nipal and Lieutenant Kirke at Deyrah Dhoon, might wish for some to enable them to carry into effect the resolutions already passed, in regard to making those places available for the purpose of acclimating seeds for after cultivation in the plains; and it was ordered, on the recommendation of the President, that some parcels should be forwarded to those gentlemen for such purpose.

It was further proposed by Mr. Cracroft and resolved, that an advertisement be issued to the effect, that unless members throughout the country apply for their shares before the 8th September next, the Society will be at liberty to dispose of the residue of seeds as they may think fit.

The Secretary submitted medals engraved for Signor Mutti, Messrs. G. W. Rose and G. Lay. and wished to know if he might deliver them to gentlemen authorized to receive them.

Proposed by the President and resolved, that the presentation of medals shall take place at the next anniversary dinner.

COMMUNICATIONS.

From Messrs. Boyd and Co., presenting in the name of Messrs. Tredgold and Pocock, of the Cape, a parcel of squash seeds.

From F. J. Halliday, Esq., Secretary to the Government, Revenue Department, dated 29th May, received 14th July, forwarding for the use of the Society, in conformity with the wish of the Hon'ble the Court of Directors, two copies of reports on the culture and manufacture of cotton, raw silk and indigo, in India.

From A. V. Dunlop, M. D., Secretary to the Agricultural Society of Azimghur, dated 7th July, in reply to the Secretary's letter of the 15th June, respecting the amount awarded by this Society, to encourage the growth of European vegetables, annexes a memorandum, specifying the manner in which it is intended to distribute the rewards.

Gives a favorable account of the Guinea grass introduced into that district. States that almost all the Otaheite canes have suffered from the ravages of white ants.

From T. O. Crane, Esq., Secretary to the Branch Society of Singapore, dated 23rd June, presenting a chest containing five sour-sop plants, and one of the "nam-nam;" promising by next opportunity to send a second supply of mangosteen plants, and some plants of a superior description of pine, together with samples of cotton, and a general report upon experiments hitherto made in that island.

From Thomas Leach, Esq., dated 17th July, presenting some strawberry seed just received from England.

N. B.—(At the service of applicants.)

From W. Storm, Esq., dated 24th July, forwarding a further specimen of the Tusser silk thread wound off by Mr. Pontet at Bhauglepore.

From the same, dated 6th August, presenting a citron grown in his garden at Chamdarri.

From Major General Sir Thomas Anbury, C. B. to Dr. Wallich, dated Saugor, Nerbudda Territories, 29th July 1838. Advising the establishment of a Society there, to be called the "Saugor Branch Horticultural and Agricultural Society," particulars of which will be hereafter communicated officially.

From the same to the Secretary, dated July 28th, acknowledging receipt of his election as a member of the Society.

From Major C. C. Smyth, dated Neemuch, July 10th, presenting a few seeds of birch, beech and alder trees, lately received from Van Dieman's Land.

From Dr Wallich, dated August 5th, presenting in the name of Major Archer, a quantity of Creole paddy, brought by that gentleman from Bourbon.

From T. H. Gardner, Esq., dated August 6th, presenting a small sample of Assam tea, prepared by Dr. Scott.

From Major H. C. M Cox, dated Barrackpore, July 30th, forwarding a few observations on experiments made on the juice of the berry or fruit of the "Passiflora Minima," which has the property of yielding a fine purple dye, that turns on exposure to the sun to a brown color similar to "Sepia," enclosing a sample of muslin dyed purple, and paper tinted with the brown.

From James Prinsep, Esq., Assay Master, dated 6th August, forwarding three gold medals, struck at the mint for the Society, two engraved and one blank, the amount cost of which is Rs. 369-10-0.

From W. Bruce, Esq., dated July 27th, intimating his intention of entering extensively into the grazing of sheep at and in the vicinity of Dorjeling. Mentions having already there a flock of Tartary sheep, of fine fleece, and is now taking up some Doombah, Patna, and Merino rams and ewes. Mr Bruce is informed that within a very trifling distance of Dorjeling, immense tracts of grazing ground are entirely free of forest, and is sanguine that at Dorjeling he will be able to graze a very tolerable proportion, and from what he has seen of the country that he will succeed in his views.

From Captain E. Rose, Commander of the *John Fleming*, dated July 27th, intimating that he has brought out six Norfolk rams from England, with the intention of competing for the premiums offered by the Society.

From W. G. Rose, Esq., dated Ramnaghur, 2nd June, acknowledging receipt of Secretary's letter of the 15th idem, announcing that the Society had awarded him the gold medal for the best sample of raw silk, and requesting the same may be made over to W. Storm, Esq.

From Lieutenant H. Bigge, dated Gowhatti 1st July, forwarding a sample of cotton grown in his farm at Bissnath from Pernambuco seed.

From James Anderson, M. D., Secretary to the Agricultural Society Beerbhoom, applying for Otaheite sugar-cane, &c.

From J. W. Wilson, Esq., M. D., Secretary, Agricultural Society of Commillah, dated 23rd July, applying for Otaheite sugar-cane and seed.

From Col. Lloyd, dated Dorjeling, 23rd July 1838, acknowledging receipt of cotton and garden seeds and transactions. States his opinion that coffee and tea plants are likely to thrive at and about Dorjeling.

From the Society of Natural History, Mauritius,—its 8th Annual Report.

From the Royal Asiatic Society of Great Britain,—its Journal No. 8.

From Mr. Bell, a quantity of fresh Guinea grass seed, and of the "Anbury" melon grown by N. Alexander, Esq.

From Major Sleeman, giving extracts from his Diary in 1835, on the subject of a blight which attacked the wheat and other grain crops, with some interesting details relative to the superstitious notions of the natives as to the causes.

(Referred to the Committee of Papers.)

From Samuel Smith, Esq., dated 8th August, presenting some very fine ripe figs.

A sample of wool, from Mr. Cope of Meerut, referred to in his letter of May proceedings.

The thanks of the meeting were ordered to be offered for all these communications and presentations. —

JOHN BELL, *Secretary.*

Town Hall, 8th August, 1838.

PROCEEDINGS OF THE AGRICULTURAL
COMMITTEE.

A meeting of the Agricultural Committee was held at the residence of Dr. Wallich, H. C. Botanical Garden, on Thursday, June 28, 1838. *

Present.

Dr Wallich,	Thomas Leach, Esq.
William Storm, Esq.	John Bell.

The Committee visited the Nursery, and are glad to report the canes to be in a very promising condition. It is gratifying to observe, that the white ants, which are represented as most destructive to the Otaheite cane in the districts of Jaunpore, Mirzapore, Deyrah Dhoon, and many other places, even as far as Mhairwarrah,—have not committed (excepting in a few instances) any ravages on the cane in the Society's Nursery.

The Committee have recommended that a straggling plot of cane (the residue of sundry unequal cuttings) be taken up and appropriated for filling gaps in the regular plots.

A large portion of available land being ready dug and unoccupied*,—the Committee have resolved to plant some part of it with Guinea grass, and with some Otaheite cane, which Mr. Bell has offered to make over.

Dr. Wallich informed the Committee that he had reduced the number of coolies, who had been employed during the hot months in irrigating the sugar-cane, from 50 to 30, and suggested that ten more might possibly be dispensed with,—but the Committee are averse to reduce the number at present, as they recommend that the cane holes should be completely levelled, and some of the larger canes hoed up.

The Committee regret to report that the cane packed with so much care at Bourbon and presented by Major Archer, which had been received on the 21st of March, had very partially vegetated;—the Committee attribute this failure to the canes having been top-cuttings.

* This land had been dug at intervals, when partial showers rendered irrigation unnecessary, for the purpose of receiving a large consignment of cane from the Mauritius, which has, however, not come to hand.

Read a letter from Mr. Balestier, American Consul at Singapore, &c.

Resolved.—that the Secretary be requested to return thanks, and to ask Mr. Balestier to send a small supply of cane.

(Signed) N. WALLICH, M. D.
 „ CHARLES HUFFNAGLE,
 „ W. F. GIBBON,
 „ THOMAS LEACH,
 „ W. STORM,
 „ JOHN BELL.

(Friday, August 3rd, 1838.)

Proceedings of the Agricultural Committee assembled by appointment at the Nursery of the Society in the H. C. Botanical Garden, on Friday morning the 3rd August, 1838, at six o'clock.

Present.

Dr. Wallich, Mr. W. F. Gibbon, Mr. John Bell.

The Committee met with a view to fix upon a site for a small fruit, &c. Nursery in the neighbourhood of the sugar-cane plantation to meet the views of the Society in giving effect to Section 3 of motion No. 1, of 9th May, 1838, confirmed by a General Meeting of the Society on the 13th June last.

Dr. Wallich and Messrs. Storm and Bell, had on a previous day inspected two plots of ground pointed out by Dr. Wallich, as available and at the service of the Society for the object in view; and not being quite determined as to which they would select, the Committee have now determined that the first spot suggested by Dr. Wallich is most eligible on account of the shade and protection which will be of advantage, as the Committee are of opinion that very little soil will be required, desiring to confine their operations for the present to the collection of young fruit-tree grafts, which for the most part will remain in pots, so that beds will only be required for such as the vine, &c. which can be successfully multiplied by layers and cuttings.

The Committee have the pleasure to acknowledge the receipt of the following contributions, which form the nucleus of the Society's fruit-tree depository, and will be thankful for all presentations which

parties having gardens and desirous of supporting the views of the Society may be disposed to tender.

From J. W. Laidlay, Esq., Secretary to the Society at Moorsheadabad. 4 grafts of very superior varieties of mangoes.

From J. W. Chew, Esq., 4 plants of varieties of superior Strait's plantains and of the woondee, peculiar to the Straits.

From Mr. John Bell, 17 plants of the white Constantia vine ; received for Mr. Ivison, Diamond Harbour.

Five plants of the Soursop, 1 plant of the Namnam, received from T. O. Crane, Esq. of Singapore.

The Committee propose to adopt this mode of acknowledging contributions, and recommend that the Society should resolve not to sanction any distribution for at least one year from this date, when they hope to have accumulated a considerable supply of rare and esteemed fruits. The Secretary having already ordered supplies from England, America, and the Eastward, &c.

They further recommend that delivery of plants be limited to the same months as now observed by the rules of the Botanical garden.

The Committee are happy to say that the condition of the sugar-canes is all they can desire. The Otahcite and Singapore canes are in the most vigorous state of vegetation ; and the former, the produce of Major Sleeman's supply, planted in February and March last, present one continued field of the most promising cultivation.

The Committee are of opinion that the cane nursery could not be better, and are sanguine that the produce will amply make amends for all the disappointment experienced at first.

(Signed) N. WALLICH, M. D.
 „ W. F. GIBBON,
 „ THOMAS LEACH,
 „ W. STORM,
 „ „ CHARLES HUFFNAGLE,
 „ JOHN BELL.

WOOL.

Report of the Cattle Committee on specimens of Wool submitted for their opinion.

SAMPLES.

No. 1. Sample of Wool of the flock of Bickancer's sheep,—the property of C. R. Prinsep, Esq., now at Allipore, (received 9th March, 1838.)

No. 2. Sample of Wool from an imported Merino ram,—belonging to W. F. Gibbon, Esq.

No. 3. Sample of Wool from a Merino lamb of five months,—belonging to the same, (received 14th March, 1838.)

No. 4. Sample of Wool from a Jeypore sheep of six months,—from Capt. H. J. Wood.

No. 5. Sample of Wool from a Jeypore wether of two months,—from the same, (received 11th April, 1838.)

No. 6. Sample of Wool from four imported South Down sheep,—from W. Storm, Esq., (received 9th May, 1838.)

No. 7. Sample of white Wool.

No. 8. Sample of grey Wool.

No. 9. Sample of black Wool. These three samples are from Merino sheep, bred by Mr. Vety. Surgeon Hulse, (received 9th May, 1838.)

No. 10. Sample of Thibet Wool, brought down to Sudiya by the Mishmees,—from Captain Jenkins, (received 21st June, 1838.)

REPORT.

The Committee have been required to give an opinion upon these specimens; but they would prefer to leave this preliminary measure to persons better informed on such matters, and recommend that the Secretary be directed to transmit these samples (excepting Mr. Storm's English Wool) to the Committee of Agriculture and Commerce of the Royal Asiatic Society of Great Britain, with a request that a report upon them be obtained from competent brokers; and that the Committee be solicited to procure and send out to this Society samples of the most approved kinds of Wool as subjects for comparison.

From the slight experience which some members of your Committee have had in the breeding of sheep in this country, and the general premises deducible therefrom, they are disposed to think

that the attempt to breed sheep in the plains of Bengal for the sake of the wool, would not be attended with success; although Mr. Prinsep states having "found that the cross of the Doombah sheep with the Patna gives a lamb with a curly fur, precisely of the same nature as that of which the Persian caps are made," and is "inclined to think this kind of *fur* might be largely produced even in Bengal;" and, Mr. Prinsep adds, "it has this recommendation that the *lamb* of the Doombah gives meat of the most estimable kind."

Mr. Gibbon observes a similar result in a cross between the Merino and Patna sheep,—the wool of the lamb is very fine and curly until it has passed the second month.

These samples warrant the Committee in expressing a hope that, although as a commercial speculation they think the soil and climate of Bengal decidedly opposed to the successful rearing of sheep, there is still ground for the exercise of much useful experiment, and they would wish all who do practically take an interest in the question, to submit their results to the Society, whether successful or not.

The site of, or below Darjeling appears to your Committee worthy the attention of the Society, in the prosecution of inquiry on the subject of improving Indian Wool, so as to render it an article of commercial importance.

Colonel Lloyd has offered to forward the views of the Society, and Captain Bruce, who is on the eve of proceeding to Darjeling, states his intention of entering into the grazing of sheep extensively, and offers in like manner to be of service to this body.

The Committee with such able coadjutors have no doubt but ere long they will be enabled to lay some interesting particulars before the Society; and suggest that a copy of this report be forwarded to Colonel Lloyd and Captain Bruce, with a request that these gentlemen will afford them all the information they collect on the experiments which Captain Bruce intends to make, and also that they will give the Committee what information they can of the prospect of a wool-trade with Thibet.

The Committee further recommend, that the Secretary be directed to communicate with parties in such parts of the country as are known to be favorable to sheep, and to request samples of the several varieties, with as many particulars relating to the season of dropping their lambs, shearing, &c. as possible; and that he be desired to obtain from the Agricultural Societies of Bombay and Ma-

dias specimens of the varieties of wool, from the flocks which are understood to have been placed at their disposal by Government, and of the kind or kinds of wool which are now largely exported from Bombay, especially of the Kerman sheep, which are understood to furnish the bulk of that export*.

The Committee, without vouching for the accuracy of the rates, annex the wholesale price of wool and grass-fed sheep, in most of the districts and their dependencies under this Presidency, which has been extracted from a work compiled and revised up to December, 1826, at the Commissary General's office, and may be useful in drawing out more fully detailed information.

WOOL.		SHEEP. (grass-fed.)	
No. of seers obtainable for a rupee.		Sa. Rs. per corgie.	
Futteghur,.....	10 seers	10	
Cuttack,	8	20	
Mirzapore,	6	11	
Mundleshur,	5 or 6	50 to 60	
Allahabad,.....	4	20	
Jaunpore,	4	20 to 25	
Buxar,	4	14 to 17	
Kurnaul,	4	18 to 20	
Indore,	4	25 to 30	
Oozeen,	4		
Nagpore,	4	10 to 50	
Batool,	4	50	
Goruckpore,.....	3½	8 to 12 (plentiful)	
Cawnpore,.....	3¼	35	

* Statement of the exportation of Wool from Bombay.

In the Official year ending 30th April, 1834	lbs.	69,911
Ditto ditto	„ 1835	„ 4,86,528
Ditto ditto	„ 1836	„ 11,96,664
Ditto ditto	„ 1837	„ 24,44,019

At present the chief supplies of the article are drawn from Cutch and Scinde and from Marwar via Guzerat. Small quantities also are received occasionally from the Persian Gulph and the Red Sea.

From these sources of supply, and from the active measures taken by Government to improve the Fleeces of the sheep in the extensive pastoral country of the Deccan, so well adapted for the carrying of such experiments into effect, the export trade in Wool promises in a few years to be one of the most important and valuable from Bombay.

(Report of the Commerce of Bombay for the years 1836-37.)

WOOL.		SHEEP, (grass-fed,)	
No. of seers obtainable for a rupee.		Sa. Rs. per corg.	
Meerut,	3 to 4	10 to 25	
Saugor,	3½	20	
Keitah,	3½	15	
Mullye,	3½	12	
Bhopalpoore,	3	20	
Hoosunghabad,	3	80	
Jubbulpore,	3	20	
Nusseerabad,	3	0	
Midnapore,	3	20	
Dinapore,	3	10	
Seetapore,	3	16	
Ghazeeapore,	3	15	
Chunar,	3	15	
Secora,	2½	10	
Bareilly,	2	20	
Agra,	} Prices not given.	19	
Secrole, (Benares.)		12	
Ghazeeapore,		15	
Kalingar,		15	
Lohargong,		15	
Hurmannah,		17	
Loodiannah,		16	
Hansi,		18	
Mhow,		30 at 35	
Nonlye,		26	
Seonce,		45	
Neemuch,		25 at 20	
Gurrawarrah,		30	
Calcutta,		26 at 45	

(Signed) C. K. ROBISON, V. P.
 CHARLES HUFFNAGLE.
 WM. STORM,
 N. WALLICH, M. D.
 NATHL. ALEXANDER,
 C. R. PRINSEP,
 WM. F. GIBBON,
 JOHN BELL.

Calcutta, July, 1838.

PROCEEDINGS OF A SPECIAL MEETING.

AUGUST 29, 1838.

Agricultural Society of India.

A Special Meeting was held in the Society's Room, Town Hall, agreeably to the following Advertisement : viz.

“ To take into consideration such circumstances as may be brought before it, relative to the state and management of the Nursery from the 21st August to the 18th September, 1837.”

PRESIDENT.

The Hon'ble Sir E. RYAN, President, in the chair.

Rajah Radakant Deb Bahadoor, V. P. ; Mr. James Pattle, N. Wallich, M. D., V. P. ; Messrs. W. F. Fergusson and W. Cracroft ; Col. McLeod ; Capt. Pemberton ; Messrs. W. Ainslie ; H. Cowie ; Samuel Smith, D. Hare ; R. Watson ; A. Colvin ; C. Huffnagle, M. D. ; D. B. Syers and Thomas Leach ; Capt. Speirs ; Professor O'Shaughnessy ; Messrs. W. Storm ; W. K. Ewart ; J. H. Stocquer ; A. Holmes ; C. R. Prinsep ; C. Dearie ; W. Jackson ; H. J. Leighton ; C. A. Dyce ; W. F. Gibbon ; A. Grant ; T. H. Gardiner ; M. G. Rose ; T. P. Morell ; E. Preston ; R. H. Strickland ; M. G. Staunton ; T. Brae ; J. S. May ; N. Hudson ; T. S. Kellsall and Jno. Jenkins ; Lieut. Sibley ; The Rev. T. Boaz ; Dr. Egerton ; Capt. H. J. Wood ; Capt. Carter ; Messrs. J. W. Masters ; Thos. Bracken and G. A. Prinsep ; Baboo Pearymohun Day ; Mr. Colin Campbell ; Dr. Macpherson ; Messrs. W. Dowson ; R. Smith ; Jas. Crooke and F. L. Beaufort ; Baboo Dwarkanath Tagore ; Lieut. Abercrombie ; Messrs. A. Beattie and N. Alexander ; Dewan Ramcomul Sen ; Mr. R. Walker ; Baboo, Prosonocomar Tagore ; Messrs. W. Cobb Hurry ; Thos. Holroyd ; P. Sutherland ; Rustumjee Cowasjee ; A. Gouger ; J. P. Marcus ; A. Porteous ; Thos. Palmer and John Bell. *Visitor*, Mr. John Franks.

The President opened the business of the day by reading the advertisement calling a Special Meeting ; and drew the attention of Members to the following correspondence.

(No. 1.)

Mr. Cracroft's letter to the President.

TO THE HONORABLE SIR EDWARD RYAN,

President of the Agricultural and Horticultural Society of India.

HONORABLE SIR,

In consequence of the publication of a pamphlet containing a certificate given by Mr. Masters, relative to our visit to the Nursery Garden, we have thought proper to put certain questions to that gentleman, to which he has declined to reply. We submit the correspondence for your consideration and that of the Society, before whom we request you will do us the favor to lay this letter.

2. We also think it necessary to offer a detail of what passed during our visit to the Nursery, and of what we heard and observed there in regard to any change in its state, between 21st August and the time of our visit, on the 18th September last. On the landing of the first party, consisting of Mr. Ainslie, Mr. Colvin, Mr. Gibbon and myself, at the garden gate, we were met by Dr. Wallich, who accompanied us in the direction of the Nursery, being in conversation with myself, and after pointing out the path leading thither, he left us, and no communication whatever took place regarding the state of the Nursery. Mr. Masters met us at the gate with Dr. Wallich and was in attendance the whole time. The Nursery was afterwards visited by Mr. Hare and Mr. Stirling together, and subsequently by Mr. Watson, on the same day.

3. The Secretary did not accompany either of the three divisions to the Nursery as implied by Mr. Masters' certificate, and which implication he has not denied; the Secretary was indeed there when the first party were about to quit the Nursery, and he spoke casually to Mr. Gibbon, but not on the subject of the visit, and immediately afterwards walked away.

4. Mr. Masters gave the first party unequivocally to understand, that the Nursery was substantially in the same condition in which it had been at the time of Dr. Griffith's visit. Mr. Cracroft and Mr. Gibbon distinctly recollect that Mr. Masters was questioned on this point; and Mr. Hare, Mr. Stirling and Mr. Watson afterwards questioned the maalees, and received the same information. Mr. Masters was of course not understood to allude to a large patch of land, trenched for the reception of new importations, and on which labour-

ers were seen at work ; but principally to the cotton beds, which were the chief object of our inquiry.

5. I particularly questioned Mr. Masters, whether he experienced *any clog from any quarter*, upon his exertions in keeping the Nursery in good order, or whether he met with any interference or opposition to his views and wishes ; on these heads he answered by a decided negative. I repeated the question in a different form, whether he met with confidence and co-operation, and this met with as decided an affirmative ; he added, that he acted under the orders of Dr. Wallich, who was head of the garden, but who readily attended to any suggestion which he offered ; he also told the party, of which I was one, that any trees could be cut down if the situation was thought too confined, but that he did not think that it was so.

6. Understanding that Mr. Masters has been the principal manager of the Nursery, and finding as we did, that his exertions have been perfectly controlled, we cannot help observing, that if any thing was found to blame on the 21st August 1837, it must have been in consequence of Mr. Masters' neglect, and that he alone should bear the blame ; and if any change had been made in the interval alluded to, it must have been with his knowledge and assent, but this, as above stated, he fully denied to the first visiting party.

7. We have thought it necessary on our own account to bring this statement to the notice of the Society, and we trust we shall not be considered to have troubled them unnecessarily.

8. Finally, we request, with reference to a report that you, Honorable Sir, are likely to be absent from the Presidency at our next regular meeting, that you will have the goodness to call a Special Meeting of the Society to take into consideration such circumstances as may be brought before it, relative to the state and management of the Nursery from the 21st of August last year, to the date of our visit, on any day which may appear convenient.

I have, &c.

W. CRACROFT,

Chairman of the Select Committee.

Calcutta, 24th August, 1838.

Present at the Meeting of 24th.

W. Ainslie,

W. F. Gibbon,

A. Colvin,

D. Hare,

Wm. Cracroft,

Robert Watson.

(No. 2.)

Mr. Cracraft's letter to Mr. Masters.

TO J. W. MASTERS, ESQ.

DEAR SIR,

With reference to a pamphlet lately published by Dr. Griffiths, to which a certificate with your name is attached, I beg to make the following observations, and solicit information in reply to queries contained in this letter.

You were present at the Meeting of the Society on the 13th September last, when Dr. Griffith's letter of the 24th August, the Secretary's reply and Dr. Griffith's rejoinder were read, and when myself and other gentlemen were named as a sub-committee to visit and report on the state of the Nursery, and it was observed on the occasion, that the Nursery Committee's hands having been tied since the receipt of Dr. Griffith's letter, it was desirable that an evening should be fixed for the next meeting.

You were also present at the garden visit, myself and several others of the sub-committee visited it and accompanied us all over the Nursery.

I observe further, that Mr. Bell's statement published in the papers, relates especially to the *cotton beds* having been left as they were for our inspection, whereas your statement published in Dr. Griffith's pamphlet, certifies the employment of ten coolies and a boy generally in the Nursery after his visit.

1stly.—If the ten coolies and boy were not the same as those previously entertained, and were employed during that time in digging and trenching the beds of sugar-canes, and that which we observed prepared for a new importation of canes, &c., and not in digging, weeding or turning the cotton beds, I shall be obliged by your certifying in reply that such was the case, and in that event no replies will be necessary to the following questions.

2ndly.—If the ten coolies and boy were employed in addition to the hands previously entertained in the Nursery, why did you not state that fact at the meeting of the Society on the 13th Sept. when the hands of the Nursery Committee were declared to be tied till an inquiry should be made?

I put this question, because it appears to me, that as a member of the Society, you should and might, under such circumstances, have

prevented the appointment of a Sub-Committee, by mentioning that the Nursery was no longer in the state in which Dr. Griffith had seen it.

3rdly. If the ground of the cotton beds had been turned up and weeded during the interval between the 24th August and the date of our visit, what might be your reason for keeping myself and the other Members of the Society who visited the garden in the dark as to that fact, either at that time or subsequently?

4thly.—Your certificate states, that on the 18th September the garden was visited by the Select Committee and the Secretary," implying, as it seems, that the Secretary accompanied the members of the committee on their visit. Have the goodness to state if such was the case, and if any, and what communication passed between the Secretary and any member of the committee, or could have passed without your cognizance.

I address you at the request of the Members of the Sub-Committee who visited the Nursery with the exception of Mr. Stirling, who is not at the Presidency, and by their desire beg the favor of an early reply.

I am, dear sir, your most obedient servant,

W. CRACROFT

(No. 3.)

Mr. Masters' Reply.

TO W. CRACROFT, ESQ.

DEAR SIR,

I have been favored with your very polite letter of this date, and am extremely sorry that I cannot consistently comply with your request, by furnishing answers to the questions which you propose.

I am, dear sir,

With the greatest respect, your obdt. servt.

Botanic Garden, Aug. 20, 1838.

J. W. MASTERS.

(No. 4.)

Mr. Cracroft's letter to Mr. Masters.

TO J. W. MASTERS, ESQ.

DEAR SIR,

After receiving your reply, declining to answer any of the queries contained in my letter (dated I think the 20th), the Select Com-

mittee thought it necessary to address the President of our Society on the subject; as it appears just that you should be aware of the nature of that address, I communicate a copy of it for your information.

I remain, &c.

W. CRACROFT.

(No. 5.)

Mr. Masters' Reply.

TO W. CRACROFT, ESQ.

DEAR SIR,

I have the pleasure to acknowledge the receipt of favor of this date, together with a copy of an Address to the Honorable Sir Edward Ryan.

I remain, dear sir,

With respect, your obdt. servant,

Botanic Garden, Aug. 26, 1838.

J. W. MASTERS.

(No. 6)

Nursery Committee's Letter to the President.

THE HON'BLE SIR EDWARD RYAN,

President of the Agricultural Society of India.

HONORABLE SIR,

We are compelled to bring to your notice the enclosed copy of a letter addressed by us to Mr. J. W. Masters on the 10th instant.

To this letter we have received no reply, indeed none could have been returned without Mr. Masters' placing himself in a still more humiliating position than he already occupies.

We gave the most positive orders to Mr. Masters not to allow any part or parts of the Society's Nursery to be touched, to which allusion had been made, and our perfect conviction is, that if the Nursery was in an "untidy" state, as represented by Mr. Masters on the 21st August, 1837, it must have been in a still more "untidy" state when visited by the Special Committee on the 18th September.

We have nothing further to add, except the expression of our confident hope that the Society will adopt some measure that will place our conduct and motives in an unquestionable light before the public.

We have the honor to be,

Hon'ble sir,

Your very obdt. servts.

N. WALLICH, M. D.

WM. STORM,

JOHN BELL.

Calcutta, 21st August, 1838.

(No. 7.)

Nursery Committee's Letter to Mr. Masters.

MR. J. W. MASTERS.

SIR,

A pamphlet having appeared under the signature of Mr. William Griffith, bearing the title of "Supplement to Vol. V. of the Transactions of the Agricultural and Horticultural Society of India, in which, at page 17, is a declaration signed "J. W. Masters," Member of the Agricultural and Horticultural Society of India, bearing date Calcutta 29th July, 1838; we, who constituted the Committee appointed by the Agricultural Society of India, to superintend and direct operations in the Nursery at the time to which the said declaration refers, feel called upon to request that you will be pleased to state in the most unequivocal terms, by whose orders, or with whose knowledge, the simultaneous operations of "digging, hoeing, weeding and otherwise clearing the Society's Nursery" were carried on?

2. We request you will inform us, with reference to that part of your declaration*, what alterations had taken place, (as we do not understand the exact meaning of the term "untidy,") and whether during this interval you were not desired by the Committee, and repeatedly enjoined by Dr. Wallich, not to allow any of those parts of the Nursery to be touched to which Mr. Griffith's animadversions especially applied?

* "And that the Nursery did not exhibit the same untidy appearance on the 18th September last, when visited by the Select Committee and the Secretary as it exhibited on the 21st August when visited by Dr. Griffith."

3. Since you have noted particularly the number of labourers employed, you will be pleased also to state whether those hands formed the establishment of July and August 1837, and whether any accession of labor* was brought to bear on the Nursery between the date of Mr. Griffith's visit and the meeting at the garden, of the Select Committee; and whether the "untidy appearance" of the Nursery was improved by the orders, or with the sanction of any of the undersigned, individually or collectively, or whether it was lessened by any orders emanating from yourself.

These are points on which we request you will be explicit.

4. As you have declared that the Nursery was in an untidy state when visited by Mr. Griffith, will you say whether you did, at any time bring this, your opinion, to the notice of the Committee, or to the notice of the Superintendent of the Botanical Garden, with whom you had daily opportunities of communication, and whether you never thought it a part of your duty to notice the "untidy" state of the Nursery in your Journal †, and how you reconcile the statements hereunder in juxtaposition?

(Extract from Journal written
by Mr. Masters, 27th July, 1837.)

"All the Canes, and all the Cotton, with every other plant of interest, are looking very well.

(Extract from Mr. Griffith's
Pamphlet.)

"I hereby declare, having been called upon to do so as a member of the Agricultural and Horticultural

* Extract from Bills sent in monthly under the signature of Mr. Masters, head Gardener, and paid by the Secretary on account of the Society's Nursery.
Number of Labourers employed.

1837.	Head Malce.	Mate.	Coolies.	Ticca. Coolies.	Boys.	tal.
January,.....	1	0	4	7	0	12
February,	1	0	4	6	0	11
March,	1	1	3	6	0	11
April,.....	1	1	3	6	0	11
May,	1	1	3	6	1	12
June,	1	1	3	6	1	12
July,	1	1	3	6	1	12
August,	1	1	3	6	1	12
September,.....	1	1	3	6	1	12
October,.....	1	1	3	6	1	12
November,.....	1	1	3	6	1	12
December,.....	1	1	3	6	1	12

† "Journal of proceedings at the Honourable Company's Botanical Garden, in behalf of the Agricultural Society of India."

Two fine beds of Asparagus plants from American seed—eight plants of Mr. Stirling's cotton from Fernando Po. Nearly all the ground is trenched, ready for cropping."

tural Society of India, that between the 24th of August and the 3rd of October 1837, ten men and one boy were constantly employed in digging, hoeing, weeding and otherwise clearing the Society's Nursery. And that the Nursery did not exhibit the same untidy appearance on the 18th September last, when visited by the Select Committee and the Secretary, as it exhibited on the 21st August when visited by Dr. Griffith."

J. W. MASTERS,

*Member Agr. & Hort. Society of
India.*

Calcutta, July 29, 1838.

Lastly, we request you will state, if, from a state of things which appears, by the above entry, to have called forth your unqualified praise on the 27th July, such a material change took place in the aspect of the Nursery, as to make you declare that, when Mr. Griffith visited it on the 21st August, it bore an "untidy appearance," you can, in any manner, account for such change? Did it proceed from relaxed vigilance on your part, since the 27th July, when you expressed so favourable an opinion of things in general; or owing to what cause do you ascribe the sudden change of sentiment?

On the other hand, as the Nursery is declared by you to have as suddenly recovered from an "untidy" state after Mr. Griffith's visit, as it had elapsed into between the 27th July, and the date of such visit, you are requested to state, if greater vigilance on your part was the cause, or owing to what circumstance this singular fluctuation of opinion has been effected.

Or, in other words:—

With the same complement of labourers, as when the Nursery was described by you to be in a promising condition, how do you account for its assumed unfavourable state, and for having allowed it to get into such a state, at that particular moment when Mr. Griffith's animadversions appeared; and by what extraordinary means was it

brought back to its previously admitted promising condition, when visited by the Special Committee?

We are sir, your obedient servants,
 N. WALLICH, M. D.
 W. STORM,
 JOHN BELL.

Calcutta, 10th August, 1838.

The above Correspondence having been read from the chair, Mr. Masters addressed the Meeting on the several points adverted to therein.

RESOLUTIONS.

No. 1.—Moved by Mr. Cracroft, seconded by Mr. W. F. Fergusson—“That Mr. Masters, in giving Dr. Griffith a certificate for publication at variance with the statements made by him to the Members of the Select Committee, whom he accompanied to the Nursery, has acted with a want of regard to the interests and credit of this Society.”

This motion having been put to the vote, there appeared on the names being noted,

For the motion,	54
Against it,	1

Carried by a majority of, 53

No. 2.—Moved by Mr. C. Dearie, seconded by Mr. T. S. Kellsall—

“That as Dr. Griffith's charge respecting the state of the Society's Nursery, when he visited it on the 21st August, 1837, is substantially correct, this Society expresses its regret, that owing to some misunderstanding in the evidence upon the question submitted to the Committee, whereby their report is at variance with his, and the Society apologizes to Dr. Griffith for the discrepancy thereby occasioned in the Committee's Report, as well as for the rejection of his last communication.

Mr. Stocqueler moved the following amendment on Mr. Dearie's motion.

“ That as no evidence has been adduced to show that Dr. Griffith had made a mis-statement *knowingly*, regarding the condition of the Nursery on the 24th August, regarding the proceedings of the Committee (since it appears he had evidence on which he had then every reason to rely) that the reply to Dr. Griffith’s last letter be withdrawn.

Mr. W. F. Fergusson moved as an amendment on Mr. Stocqueler’s proposed amendment, seconded by Mr. A. Beattie.

“ That the Society adhere to their former Resolutions regarding the Nursery, and also with respect to Dr. Griffith’s communication, which they consider offensive in its language and wholly uncalled for on the occasion ”

This last amendment having been put to the vote, there appeared on the names being noted,

For it.....	52
Against it.....	4

Carried by a majority of.....	48

No. 3. Moved by Mr. C. R. Prinsep, seconded by Mr. Richard Walker—

“ That this Meeting do now adjourn, *sine die* ”—carried *nem. con.*

No. 4 Proposed by Mr. Pattle, seconded by Baboo Dwarka-muth Tagore—

“ That the whole of the correspondence this day submitted to the Meeting, and the resolutions passed, be published at full length in the newspapers and proceedings of the Society—carried.

On the proposition of Mr. C. R. Prinsep, the thanks of the Meeting were unanimously voted to the President for his conduct in the Chair.

JOHN BELL, *Secretary*.

Town Hall, Calcutta, 29th August, 1858.

* N. B.—Of course neither the President nor Members of the Special original Nursery Committee voted.

SEPTEMBER 12, 1838.

Agricultural Society of India.

A General Meeting of this Society was held at the Town Hall.

Present.

The Hon'ble Sir E. Ryan, President, in the Chair.

Dr. Wallich, V. P., Messrs. C. K. Robison, V. P., W. Cracroft, W. F. Fergusson, W. Storm, Colin Campbell, G. A. Prinsep, E. Preston, J. S. May, T. P. Morell, C. Trebeck, G. T. F. Speed; Dewan Ramcomul Sen; Dr. Strong; Capt. Speirs; Messrs. W. Spier, W. G. Rose, D. B. Syers, J. P. Marcus, Robert Watson, Robert Campbell, A. G. Harris, D. Hare, W. K. Ewart and John Bell.

Visitors.—Dr. Helfer and Major Archer.

The proceedings of the last General Meeting, and of the Special Meeting of the 29th August, were read and confirmed.

Members elected.—The following gentlemen, proposed at the August General Meeting, were elected, by ballot, members of this Society.

E. MacIntosh, Esq., G. Gibbon, Esq., D. C. Low, Esq., G. H. Clark, Esq. C. S., J. St. Pourcain, Esq., C. R. Richardson, Esq.

Members proposed.—The following gentlemen were proposed as members, viz. :

Baboo Sree Kissen Mullick, proposed by Capt. H. J. Wood, and seconded by the Secretary.

Edward Bathurst, Esq., of Mirzapore, proposed by the Secretary, and seconded by Mr. Storm.

James Mackenzie, Esq., of Howrah, proposed by the Secretary, and seconded by Mr. Storm.

James Stewart, Esq. of Furreedpore, proposed by W. Spier, Esq. and seconded by the Secretary.

W. Dunbar, M. D., proposed by the Secretary, and seconded by Dr. Wallich.

Henry Cope, Esq., of Meerut, proposed by W. F. Gibbon, Esq., and seconded by the Secretary.

G. Rogers, Esq. of Bowsing, proposed by W. G. Rose, Esq., and seconded by W. Storm, Esq.

P. Rayson, Esq. of Cossipore factory, proposed by W. G. Rose, Esq., and seconded by W. Storm, Esq.

W. Byrne, Esq., proposed by W. G. Rose, Esq. and seconded by W. Storm, Esq.

F. H. Souter, Esq., proposed by W. Storm, Esq. and seconded by E. Preston, Esq.

Baboo Koomar Lall Churn Ghosal, proposed by Dewan Ramcomul Sen, and seconded by the Secretary.

COCHINEAL.

The President opened the business of the day by reading the report of the Committee last appointed to investigate the various documents laid before the Society, since the question was first agitated, with a view to determine the point at issue between Mr. Prinsep and Mr. Bell*.

Proposed by G. A. Prinsep, Esq., seconded by Dr. Wallich, that this report be confirmed.

Mr. Prinsep, proposed to offer a few observations on the subject of the opinion formerly expressed by him, as to the insect brought from Bourbon, on the *Alcide*, not being the *grana fina*.

Mr. Prinsep, adverted to certain papers, which he had made over to the Secretary within the last week, in which some points were noticed that had escaped his recollection, since he visited South America, and this circumstance, caused him to declare his alteration of opinion in favor of the insect being the true *grana fina* of *Oaxaca*. The points that had escaped Mr. Prinsep's recollection were the *changes* which the insect was subject to; in one stage resembling in its *downy* coat, the *silvestre*, while in another it was covered with *white powder*, and the state in which the importation of insects, on which Mr. Prinsep's first opinion was based, caused him to mistake them for, and to pronounce them to be, the *silvestre*. He had since

* For a copy of this Report, see the end.

seen a more recent importation per *Therence*, at Mr. Bell's house, and was now prepared, as well from the evidence before the Society, as from his own personal inspection of the insects, to revoke his former opinion, and to concur with the Committee that the insect, under Mr. Bell's care, is the true *grana fina*.

Mr. Prinsep, in conclusion, drew attention to a motion passed by the Society on the 13th September last, awarding the Society's gold medal to any Captain or other person who shall bring round a certain quantity of the living insect, male and female, in a healthy state, &c., and proposed that the commander who brought round the last supply, which was in accordance with the condition of that resolution, should be entitled to the gold medal.

The President having stated to the meeting, that as the insect was admitted to be the true *grana fina* by the concurrent reports of two Committees and the important admission of Mr. Prinsep, it was for the Society to decide, whether the commander was entitled to the medal, and if so whether the Secretary had any doubt as to the ship and commander. The Secretary stated that he had no doubt on either point as he knew Captain Caillol, who had called upon him and given an order for the delivery of the insects—

Proposed by G. A. Prinsep, Esq. seconded by Dr. Wallich, and Resolved, that the gold medal be awarded to Captain Caillol, commanding the *Therence*.

Proposed by the President—Seconded by Dr. Wallich,—and Resolved—That the special thanks of the Society be offered to Mons. Bedier, for the interest taken by that gentleman in forwarding its views, in respect to the supply of Insects, and in furnishing such authentic information as has enabled the Committee to trace its origin, most satisfactorily, to the province of Oaxaca.

In connexion with this subject, the President submitted a memoir of Monsieur Perrottet, translated by Mr. Bell, on the means of freeing the silvestre Cochineal of its cottonny envelop, in order to become a merchantable article.

Mr. Prinsep also submitted a "method of cultivating the Cochineal in Oaxaca," in a letter from himself to H. T. Prinsep, Esq., dated London, 1820.

No. 2.—Measures pursued by the Court of Directors and the Government of India, with a view to the introduction of the true Cochineal insect.

No. 3.—A paper by Senor Carraso on the nature, habits, &c. of the Cochineal, with Notes by the same.

Resolved that all these papers be published.

The President stated, that what had fallen from Mr. Prinsep was very satisfactory, and suggested that it would be more confirmatory of his views and present conclusions, if he would be so good as to favor the Society with his sentiments in a written form, which Mr. Prinsep did by putting in a letter to the Secretary*.

NOTICES OF MOTIONS.

No. 1.—Proposed by Dr Wallich, seconded by G. A. Prinsep, Esq.—‘That a gold medal of the Society be presented to Monsieur Richard, of the Royal Botanic Garden, St. Denis, Bourbon, for the prompt and effectual manner in which he has met the wishes of the Society on the important occasion of introducing the true Cochineal into this country, and for the success which has thus far attended the valuable exertions of that gentleman.’

No. 2.—Proposed by G. A. Prinsep, Esq., seconded by Dr. Wallich,—‘That until the end of the year 1839, a silver medal of the Society be given to the commander of every ship in which a supply of the grana fina or fine Cochineal shall be brought to Calcutta in a healthy and fit state for propagating the insect, and that a silver medal of the Society be given to the commander of the vessel who brought the first supply of plants and insects in February last, though the insects perished soon after their arrival.’

Read the Agricultural Committee’s Report of proceedings of 3rd and 5th September 1838, in the last of which, some extra expense is suggested with respect to the nursery.

Resolved—That the expense being trivial and the occasion emergent, it is not necessary to give notice of motion, and that the expense be sanctioned.

MEDALS AND PREMIA FOR THE BEST SAMPLES OF STAPLE PRODUCTS.

The discussion on Mr. Balestier’s letter having attracted particular attention to the existing conditions under which premia are awardable.

* For a copy of this letter see after Committee’s Report.

Mr. D. Hare proposed, seconded by Mr. Storm, and it was resolved,—‘ That it be referred to the Committee of medals and premia to revise the conditions on which premia and medals shall be offered, on silk, cotton, sugar and tobacco, during the year ending 30th April next, with liberty to suggest the addition of other articles, or the exclusion of any of those above named.’

“ The original Committee who framed the existing conditions, viz. Messrs. Robison, Prinsep and Walters, being now reduced to two, by the absence of the latter, the President suggested that the old Committee be increased by the addition of three new members, viz. Messrs. W. F. Fergusson, W. Cracroft and R. Watson, who agreed to act.

CAPE SEEDS.

With reference to a Resolution of last meeting, the time having expired which admitted of members claiming their quotas from all parts, it was resolved—

‘ That the details respecting the residue be left to the Secretary.’

Flower seeds from Deyrah Dhoon.—A very fine, though limited collection has been received from Lieut. Kirke, of Deyrah Dhoon, which will be ready for distribution agreeably to a public notification.

COMMUNICATIONS.

Read the following communications.

From J. Thomason, Esq., Officiating Secretary to the Governor General, North West Provinces, dated 25th July, in reply to the Secretary's letter of the 4th July respecting the permission of Government to indent on the Botanical Garden at Saharunpore, for supplies of fruit-tree grafts, &c., forwards copy of a letter addressed to Captain Cautley, requesting that gentleman to comply with the Society's requisition.

From Captain Cautley, Acting Superintendent of the Botanical Garden, Saharunpore, dated 30th July, intimating, with reference to Mr. Secretary Thomason's letter to his address of 25th July, his

readiness to transmit occasional supplies of trees and shrubs, when required by the Society.

From Colonel Dunlop, dated Simla, 26th July, enclosing a note to his address from Colonel Tapp, respecting vine cuttings from Koonawur, who states that the small produce of the same description of vine at Simla, would scarcely warrant the despatch of a supply for the Society.

From Captain J. Hullock, commanding the *Donna Pascoa*, dated Port Louis, Mauritius, 15th July, advising despatch to the care of Captain Richards, of the *Carnatic*, of a bundle of Mauritius sugar-cane.

From J. Balestier, Esq, dated Singapore, 11th July, presenting two bundles of two varieties of sugar-cane grown on his estate in the island, one called the "tabootelor" or "egg-cane," and No. 2, considered identical with the Otaheite cane.

Forwards by the same opportunity a small sample of Muscovado sugar made from the Otaheite cane; and enters into a detailed account of its manufacture.

Requesting to be informed if he can enter the lists as a competitor for the premia offered by this Society to encourage the cultivation of Otaheite cane, and for the medals awardable to the producers of the best samples of Muscovado sugar.

Resolved,—That Mr. Balestier, is entitled to be a competitor for premia offered for the best samples of sugar, under *existing conditions*, but not for the cane cultivation which is limited to Bengal.

From Major Sleeman, dated Jubbulpore, 18th August, giving cover to two papers—viz. One a letter addressed by him to the editor of the *Agra Ukhbar*, in reply to observations lately made in that paper regarding the culture of the Otaheite cane, and the other containing translation of a Report upon the number of persons living in the pergunnah of Dhamonee, in the Saugur district, who lost the use of their limbs from eating the feoræ grain, when in a diseased state.

From Captain H. Kirke, to Dr. Wallich, dated Deyra, 7th August, forwarding a small sample of Muscovado sugar, the produce of an acre of country cane grown in his garden. Promises to send next year for the use of the Society, a general assortment of seeds.

N. B. Two small boxes of flower seeds have just been received and in excellent condition.

From N. Alexander, Esq., dated 24th August, presenting in the

name of Mr. William Bennett, (late of Demerara,) a practical treatise on the management and drainage of lands, by which much soil may be successfully brought under sugar cultivation in Bengal, which is now unfit for such purpose, by means of the retentive nature of the soil, and the subsequent sudden evaporation, which causes the surface soil to cake and crack. Mr. Bennett's memoir is styled "*A practical treatise on the cultivation of the sugar-cane and manufacture of sugar, interspersed with remarks on the present system of the ryots in the lower districts of Bengal.*"

From Colonel Skinner, dated Hansi, 9th August, enclosing a statement showing the outlay and produce of American cotton (Upland Georgia) grown on his farm in 1836. Adds a small sample of the cotton to which his remarks refer.

From Major J. D. Syers, Secretary, Agricultural Society of Cuttack, dated 8th September, forwarding another sample of cotton (Upland Georgia) for the Committee's opinion.

From A. Colvin, Esq., dated 8th September, enclosing copies of a letter, and memorandum received from Claude Hamilton, Esq., respecting the introduction on a larger scale and by more direct efforts than heretofore pursued of foreign cotton in the Upper Provinces and in Central India.

From James Crooke, Esq., date September, in reply to the Secretary's letter, requesting his aid in influencing the despatch of a supply of Peruvian cotton seed, states that he has already written to a friend on the subject.

Mr. Crooke notices a circumstance worthy of record. The Secretary adverting to the supply of Peruvian cotton seed presented to the Society by that gentleman, stated, that with one or two exceptions, the seed had failed; but that the little which had vegetated, was highly thought of. To these observations Mr. Crooke remarks:

"When I sent the seed to you, I retained about two seers for my own purposes, intending to sow a beegah or two with it. I placed about 40 seeds in my compound in Clive Street, as soon as the seed was landed (June) and they all throve wonderfully, some being fully 15 feet high in 12 months. The rest of my retained seed I delayed sowing till the rains were over, and then not one would vegetate. I have now about a beegah of plaut at Ishera, raised from seeds from the trees grown in my compound, and about 20 or 40 very thriving plants from seed from the *second* descent."

From Dr. A. Campbell, of Nepal, dated 27th August, requesting that the amount (200 rupees) allotted to him with reference to motion No. 1 of a general meeting of the Society on the 11th April, may be paid to Messrs. Presgrave and Co. on his account.

Presents a cannister of yellow turnip seed from Cape stock furnished by this Society.

Dr. Campbell writes: "The largest turnip measured 28 inches round. They are not good for the table, but a prime article for cattle."

From J. B. Spencer, Esq., dated Blackheath, June 5th, acknowledges receipt of Secretary's letter of the 12th January last, and in reply expresses his willingness to be of service to the Society, and to influence the speedy despatch of the trial consignment of seeds ordered from Messrs. Noble and Sons, of Fleet street.

Dr. Huffleagle informed the Secretary, that the seeds he had ordered from America through that gentleman's agency, were on board a vessel that had sailed from Boston, some time before the departure of the ship *United States*, and might be hourly expected.

From his Highness Nawab Tuhower Jung, dated Benares, 29th August, presenting four pears grown there, and offering his services to procure for the Society, grafts of this pear tree, and of other fruits obtainable in that part of the country.

From Colonel Rehling, Governor of Tranquebar, dated 16th July, acknowledging receipt of the several varieties of seed, forwarded to him by this Society, which have been distributed amongst Europeans and natives in the vicinity.

Gives a most favorable account of the Egyptian, Bourbon and Seychelles cotton seeds, particularly the former, which had vegetated freely.

From Lieutenant Munro, Secretary to the Mysore Agricultural Society, dated Bangalore 15th August. Promises in reply to the Secretary's letter of the 2nd April last, to give some information on the subject of cattle, and on the improvement of wool, together with a Report of Proceedings up to this time. Asks for Guinea grass seed and roots of the Jamaica ginger.

From Captain W. McFarquhar, dated Tavoy 23rd June, advising despatch of four plants of a shrub common to the coast, which bears a very beautiful flower; also some seeds of the "theetsee," the tree which produces a superior black varnish.

States that the specimen of cotton forwarded by him on a former occasion, was the "*South Sea Island*."

Memo. The Secretary in sending for the plants was informed by Captain Ovenstone that they were *all dead*, and the seeds of the varnish shrub on being opened were found to be mere husks and mould.

From Dr. W. Dunbar, dated Dorunda, 20th August, promising to give some information on the state of Agriculture in Chota Nagpore. Alludes to a disease termed "*Mhata*," which is even more fatal to horned cattle than the "*Goorgoora*" treated of in his previous communication.

From Dr. Wallich, dated 20th August, forwarding six nutmegs, lately received from Mr. W. Huxham, and annexes extract of a letter to his address from that gentleman, dated Puttaraveram Plantations, Quilon, giving some information regarding the culture, &c. of this production.

From Jeffrey Finch, Esq, dated Tirhoot, 11th August, promising to send a few grafts of apple trees for the Society's fruit tree nursery.

From W. G. Dowson, Esq., dated 7th September, requesting that his name may be registered as an applicant for sugar-cane, sufficient to plant 200 beegahs, intended for his plantation at Ceylon.

Resolved, that Mr. Dowson's application cannot be registered, the object of the Society being to encourage the growth of Otaheite cane in Bengal.

From Dr. Helfer, dated 10th September, giving the Secretary the result of his examination of certain parasitical animals found on the fleshy lobes of the Cactus, on which some of the Cochineal insects have perished; and referring to a paper which Dr. H. proposed to read to the meeting.

Dr. Helfer, who was present, addressed the meeting on the subject of his views in respect to the coast of Tenasserim, which he described as endowed with the richest resources, that required only labor and capital to develop them. Dr. H. seemed to rest his hope of amelioration of these provinces, on the efforts and assistance of this Society, and expressed the anxiety of Mr. Blundell and other residents, to co-operate in any measures that might be adopted, in furtherance of his object.

The President was quite willing to admit that much good might be done hereafter by the Society, and as far as the supply of seeds and plants could assist, he thought the Society would do their ut-

most, and that with right good will; but *people* were required in the first place to cultivate those seeds, and in this the Society could be of no service. If, as Dr. Helfer intimated, an experimental nursery should be organized with or without the aid of Government in any of the provinces, he might reckon upon the zealous co-operation of the Society, in promoting the object in view, but until these preliminaries were entered upon, nothing could be done.

Mr. Cracroft suggested, and it seemed to be the opinion of the meeting, that Mr. Blundell might get up a Small Branch Society even though the members were scattered far apart, so as to be a medium of correspondence with this body, and lead to arrangements that might eventually prove useful to a country represented by Dr. Helfer as full of hope.

Mr. Cracroft presented 13 volumes of Loudon's Gardener's Magazine, from the year 1826, up to 1837. Some of the Nos. wanting.

Proposed by Dr. Wallich, seconded by Mr. Storm, that the best thanks of the Society be offered to Mr. Cracroft for this valuable addition to its library.

From W. K. Ewart, Esq., a parcel of standard mulberry tree seed.

From the Secretary, a further supply of Guinea grass seed.

From J. M. Mackie, Esq., a sample of very fine country wheat.

From W. Storm Esq., dated 15th August, forwarding extracts from Hoare, on the culture of the vine, which Mr. Storm recommends be transferred to the transactions now publishing.

The thanks of the meeting were ordered to be offered for all these communications and presentations.

JOHN BELL, *Secretary.*

Town Hall, Calcutta, Sept. 12, 1838.

COCHINEAL.

Proceedings of a Committee appointed at a General Meeting of the Agricultural Society of India on the 8th August, 1838, for the purpose of reporting their opinion agreeably to the Resolution passed on that occasion.

The Committee after a careful perusal of the Papers laid before them come to the opinion that the insect brought from Bourbon is

not the species known as the *Grana Silvestre* in India, or at the Cape, and must therefore be either the *Grana Fina*, or a mixed breed, or the wild insect altered and improved by cultivation.

Monsieur Richard states distinctly that the insects were brought from Cadiz in 1826. "A été introduite a Bourbon in 1826, sous le nomme de *Grana Fina* qui l'avoit prise a Cadiz," and Monsieur Bedier says it was brought in 1826, in a king's ship (l' *Elephant*) which had touched at Cadiz.

It is a subject of history that the true *Grana Fina* and Nopal were sent from Vera Cruz to Cadiz, by an individual Don Pedro José Carraso in 1820; we have therefore no reason to doubt that the insects in our possession are derived from those imported from Cadiz to Bourbon, and are the *Grana Fina*.

(Signed) C. K. ROBISON,
 „ W. CRACROFT,
 „ W. F. FERGUSSON,
 „ WM. KERR EWART,
 „ DAVID HARE, *Secretary*.

Resolved. That this Report be confirmed.

TO JOHN BELL, ESQ.

Secretary to the Agricultural and Horticultural Society.

MY DEAR SIR,

When the first supply of Cactus and Cochineal was received from Bourbon in January last, by the ship *Alcide*, I expressed a confident opinion, after inspecting the boxes in the Botanic Garden, where they were at first deposited, that the Insects upon the plants were not of the species called *Grana Fina*, which furnishes the valuable Cochineal of commerce, but the *Grana Silvestre*, or wild species, in an improved condition; and when this opinion was called in question by yourself, I supported it by stating, that I had observed upon the Bourbon Insects, "a white silken coat, the sure characteristic of the *Silvestre*." And when, in consequence of the discussion between us, and the notice taken of the subject by the Society, you produced a plant with the Insect upon it, for the inspection of the Cochineal Committee at the Town Hall, where you invited me to meet them, I

pointed out to yourself and the other gentlemen, that every one of the Insects upon the leaf had more or less of the silken coat, though a substance like the white powder of the *Grana Fina* was also apparent upon them. However, the letters since received from Mons. Bedier and Mons. Richard, explaining the source from which the Bourbon stock had been obtained, namely, from Cadiz, in 1826, from a plantation originating in a supply of plants of Insects transmitted to Cadiz from Mexico, in 1820, by Don José Carraso, with all the circumstances of which I was well acquainted—having been at Vera Cruz, and in intimate communication with Senor Carraso, when the shipment took place—convinced me that the Insect introduced into Bourbon must be the *Grana Fina*, whatever change it might have undergone, whether by degeneracy or by crossing the breed. That a plantation of *Grana Fina* might after a time degenerate into one of *Silvestre* only, if some Insects of the latter species happened to be among the original stock, we have an example in the plantation established at St. Domingo, by Mons. Menonville, sixty years ago; and it appears by the “Instructions for rearing the Cochineal,” published by the “Cadiz Economical Society” in 1825, (one of the Papers you have printed for our Society.) that the *Silvestre* has been observed among the *Grana Fina* Insects propagated at Cadiz from the Vera Cruz stock. But all doubts are now removed by the condition in which the second supply has been received from Bourbon by the ship *Therence*, Captain Caillol, which you have now in your garden. Having seen the Insects of this second importation, I have the satisfaction to concur with yourself, in pronouncing them to be the true *Grana Fina* of Oaxaca, and the Cactus upon which they have been sent up, I was glad to recognize as one of the fine thick long-leaved species, with few thorns upon it, which I had seen in the experimental garden of Senor Carraso at Vera Cruz. You have fortunately a large stock of it already, and it seems to thrive admirably in the beds you have made for it. The plants of the last importation have upon them some mother Insects of larger size than any of the former batch, and without any silken coat whatever. Of course these Insects could be no other than the *Grana Fina*.

The interest which the subject has excited, had in the mean time induced me to look over my collection of Notes and Papers upon Mexican affairs. Among them I found a memorandum about Cochineal, copied from a paper of Senor Carraso, containing the substance

of his observations made in his experimental Nopalry, with some additional notes in his own handwriting. In this Paper a more particular account is given, than I have elsewhere met with, of the different stages of the Insect's existence; and a fact is there stated which had escaped my recollection, and which is not mentioned in any of the documents you have printed,—that in the second, or middle stage of its life, the female *Grana Fina* does resemble the *Silvestre* in being covered with a silken coat, which altogether disappears when it enters the third and last stage, which is the period of breeding. The difference between the appearance of the first and second batches of Bourbon Cochineal is thus accounted for by the difference in their age, none of the first batch having reached maturity on their arrival; and it is more than doubtful if the Cochineal mothers of that supply were ever impregnated, for they all died soon after, and the breed was lost, as you have already reported to the Society.

I now place at the Society's disposition a translation of Senor Carraso's Notes, and a memoir of my own written in 1820, shortly after my return from Vera Cruz, in the form of a letter to a brother in India, with the object of calling the attention of the Bengal Government to the importance of this branch of agriculture. Shortly after dispatching the letter, I mentioned the subject to the late Dr. Wilkins, and at his suggestion made a proposition to the Court of Directors, offering, through my private correspondence with Vera Cruz, to procure the *Grana Fina* in a living state, and send it out to India at my own expense, upon condition that I should receive a premium of 1000*l.* from the Company in the event of success. The proposition was immediately accepted, and I wrote to a Spanish friend at Vera Cruz, on whose agency I could rely; but before the letter reached him, Iturbide had raised the standard of revolt, and all communication between that city and the interior was cut off; and the revolution which very quickly ensued, obliged my friend, with all the other Europeans who could escape, to embark for Europe. My efforts to procure the Cochineal insect through that channel were consequently disappointed, and my correspondence with Mexico was at an end.

I have said that the Court readily accepted the offer of my services, with a prospective remuneration of 1000*l.* When I made the tender, I was not aware of any standing order upon the subject. However, a few days after the bargain was made, Mr. Robinson, the chairman,

who took a warm, and with respect to myself, a very kind interest in the matter, ordered the records of the India House to be searched, to ascertain what had been done before on the question of Cochineal; and sent me an extract from the records, with an intimation, conveyed through Dr. Wilkins, that as it appeared the Court had come to a resolution in 1808, to bestow a premium of 2000*l* upon the first person who should introduce the *Grana Fina* into the Company's territories, in a fit state for propagation, which resolution had never been rescinded, he thought I might claim the larger premium, notwithstanding the bargain with me, in case I should succeed in procuring and introducing the insect. My efforts proved abortive, and circumstances are now very different from what they were eighteen years ago. While the East India Company's endeavours to procure the Cochineal were limited to the offer of a pecuniary reward too small to cover the expenses of a special mission to the country of its growth, the government of France, more active in the promotion of new objects of colonial industry, availed itself of its political influence in Spain to procure it there; and, to our astonishment, we heard, for the first time in 1837, of the existence of the *Grana Fina* at Bourbon, since 1826, almost at our own doors. The Agricultural Society of Bengal, and not the East India Company, have the merit of the arrangements which have now happily succeeded in obtaining it from Bourbon. But as the Company, as well by their liberal support of the experiments at Madras with the *Silvestre* species half a century ago, as by the premium they subsequently offered, have at least evinced their opinion of the importance of the acquisition to the agricultural interests of their Indian empire, I would suggest for the consideration of the Society, whether it would not be proper to ask the Court of Directors or the local Government to place the lapsed premium of 2000*l*. at our disposition, in order that the money may be devoted to the purpose of securing repeated supplies of plants and Insects, and extending their cultivation in such parts of India, as experiment shall prove to be best suited by climate, or otherwise, to the rearing of this valuable product. The extract from the Company's records is sent herewith for the information of my brother members.

I am, &c.

G. A. PRINSEP.

Calcutta, 11th September, 1838.

OCTOBER 10, 1838.

Agricultural Society of India.

: A General Meeting of this Society was held in the Town Hall.

Present.

N. Wallich, Esq. M. D., V. P. in the Chair.

C. K. Robison, V. P., D. Hare, W. K. Ewart, W. Storm, G. A. Prinsep, Dr. Strong, Dr. Hufnagle, Dewan Ramcomul Sen, Capt. Spiers, W. Cracroft, W. F. Fergusson, J. W. Payter, Colin Campbell, H. Piddington, J. St. Pourcain, A. Porteous, John Allan, M. G. Staunton, F. L. Beaufort, R. Campbell, D. W. H. Speed, E. Preston, T. P. Morell, and John Bell.

The proceedings of the last Meeting were read and confirmed.

MEMBERS ELECTED.

The following gentlemen proposed at the September Meeting were elected members of the Society ; viz.

Baboo Sree Kissen Mullick, E. Bathurst, Esq., Jas. Mackenzie, Esq., James Stewart, Esq., W. Dunbar, M. D., Baboo Koomar Suttchurn Ghosal, Henry Cope, Esq., G. Rogers, Esq., P. Rayson, Esq., Wale Byrne, Esq., and F. H. Souter, Esq.

MEMBERS PROPOSED.

The following gentlemen were proposed as members, viz.

W. F. Campbell, Esq., Commercolly, proposed by W. Storm, Esq., seconded by D. Andrew, Esq.

Major R. Becher, Assistant Quarter Master General, proposed by Dr. Spry, seconded by Dr. Wallich.

A. A. Dunlop, Esq., Furreedpore, proposed by W. Storm, Esq., seconded by Mr. Bell.

Alexander Stewart, M. D., Tumloek, proposed by W. Storm, Esq., seconded by Mr. Bell.

George Teil, Esq., proposed by G. Preston, Esq., seconded by D. W. H. Speed, Esq.

Motions of which notice was given at the last meeting.

Motion No. 1, was brought forward, and carried unanimously.

Motion No. 2. After some discussion, Mr. C. K. Robison proposed an amendment, seconded by W. F. Fergusson, Esq., that the latter part of the original motion after the word "insect" be left out. Carried.

NOTICE OF MOTION.

Proposed by Mr. J. Bell, seconded by W. Storm, Esq., that a gold medal be presented to the Commander of the French ship *Alvide*, he having been the first successful importer of the true "*grana fina*" from Bourbon.

The Secretary presented in the name of Mr. Ivison, one dozen white *Constantia* grape-vine plants, for the Society's fruit tree Nursery.

Pamphlet No. 3 on Cochineal was laid on the table, which ends the discussion on that subject.

COMMUNICATIONS.

From J. Little, Esq., Secretary to the Agricultural Society of Western India, dated Bombay, August 30th, conveying a mass of valuable information, in reply to the queries contained in the Secretary's letters to his address under dates the 6th March and 2nd April, on the subject of the different breeds of cattle on that side of India; also respecting the improvement made in the breed of sheep and in the staple of wool. The results of experiments made with the American plough recently introduced, are given in Mr. Little's despatch.

From Dr. Huffnagle, dated 17th September, enclosing invoice and bills of lading for a case of American garden seeds (vegetable), which the Secretary had asked him to procure.

This supply consists of 70 different kinds, and although not very large, will enable members to estimate the quality of American vegetables, in contrast with those raised from Cape Stock.

Although the *Brighton* arrived off town about the 18th ultimo the case could not be got at until the conclusion of the holidays, having been through mistake covered at Madras by bales of goat skins.

The contents are now under assortment and subdivision, and will be at the service of members in a day or two, of which notice will be given.

Memorandum.—Mr. Dixwell, junior, supercargo of the American Ship *Brighton*, has called on the Secretary and mentioned, that his brother, Mr. J. J. Dixwell, had received Mr. Bell's letters under dates the 22nd April and 16th October 1837, and intended executing the several commissions therein referred to, as soon as he returned from England to the United States. These commissions were—

To forward supplies every three or four months of the different varieties of maize grown in America.

To forward supplies of all the approved grasses, cultivated in America.

To transmit some hop-plants and works on agriculture and agricultural implements, &c.

From B. H. Hodgson, Esq., dated Nipal, 12th September, presenting some red and white clover and lucerne seed, with some grass seed, given to Mr. Hodgson as prangos, but supposed by him to be guinea grass.

Note.—The grass seed is neither prangos nor guinea grass.

From Dr. Wallich, dated 4th October, presenting in the name of B. H. Hodgson, Esq. of Nipal, a bag of "oah" or "bhote barley," lately received from that gentleman; and in the name of Mr. McCullogh, gardener to the Pasha of Egypt, a quantity of Egyptian cotton and Dutch clover seed.

From Major C. Smyth, dated Neemuch, 11th September, promising to forward as soon as procurable, a quantity of lucerne seed for the use of the Society.

From His Highness Nawab Tehower Jung, dated Benares, 30th September, advising despatch by the steamer of a box, containing 12 pears, with reference to the unfavorable condition in which the last arrived, and promising to forward by the first opportunity 24 grafts from pear trees, growing at that station.

From Colonel L. R. Stacy, dated Dacca, 24th September, giving the history of the cotton, of which a sample has been lately submitted, known now as the "Stacy Cone Cotton."

Memorandum.—The Dacca safflower seeds referred to in a former communication from Colonel Stacy, have been safely received.

From Captain Kirke, dated Deyrah, September 9th, acknowledging receipt of the supply of vegetable seeds, intended for the experi-

mental garden, established by Captain Kirke and promises to forward in due season produce therefrom. Intimates having succeeded in raising several *hop* plants from seed received from Lord Auckland.

Mentions also his success with an experiment on the Otaheite cane.

From Captain C. Brown, dated Jubulpore, 20th September, enclosing a memorandum of account between the Agricultural Society and the Jubulpore plantation, for canes supplied and transmitted to the Society's nursery, amounting to Rs. 670. 15. 9.

From Monsieur Richard, dated Bourbon, 27th August, advising despatch by the Ship *Atlas* of 2 boxes containing lobes of the Castilian Nopal, which the Secretary had solicited Monsieur Bedier to procure, to form a Nopalry for the sustenance of the cochineal insect. The boxes contained 40 plants, simply packed in dry moss, and perforated at each end to admit air. They are in the most excellent condition.

Monsieur Richard states, that this cactus is known by the name of the "Mexican Nopal."

From Dr. Helfer, dated 6th October, requesting to be furnished with a supply of coffee plants, Otaheite sugar-canes, cotton, tobacco, &c. seeds for introduction in the Tenasserim Provinces.

From Monsieur Borelly, dated 20th September, acknowledging receipt of Secretary's letter and its enclosure to the address of Captain Caillol, which he promises to forward. States that he will be happy to receive for Captain Caillol, the Society's gold medal.

Memorandum.—The medal was submitted at the meeting.

From Messrs Fergusson, Brothers and Co., dated October 5th, requesting that the names of Messrs. Fergusson, Holroyd, Leighton and Campbell, may be registered as applicants for sugar-cane cuttings, deliverable in December and January next.

The degree of attention attracted to this important introduction, may be estimated by a reference to the following list of applications already registered.

J. B. Jones, of Jaumpore,.....	29,000 square feet of land.
A. Harris, Soonderbunds,.....	×
Agricultural Society of Comillah,	20 beegahs.
J. W. Payter, Bogorah,	200 ditto.
Captain Bogle,	×
Agricultural Society of Assam, ...	1 beegah or more.

Agricultural Society of Barhampore,	×
Agricultural Society of Cuttack, ...	×
Agricultural Society of Beerbhoom,	×
Robert Watson, Midnapore, &c. ...	×
John Guilding, Ditto,	×
S. Oram, Niddeah,	10 cottahs.
E. Preston, Garden Reach,	10 beegahs.
Lieutenant Sibley for General Oglander,	A few cuttings.
R. W. Chew, Howrah,	Ditto.
James Collie, Benares,	As many as can be spared,
G. A. Prinsep, ×	Ditto.
W. D. S. Smith, (not a member,)	A small quantity.
Baboo Joykissen Mookerjee, Chin- surah,	6 beegahs.
E. A. Samuells, Hooghly,	2 ditto.
C. R. Richardson, Kuntowie, Tir- hoot,	100 canes.
D. McPherson, Midnapore,	10 beegahs.
Dr. J. Morton, Akyab,	A few cuttings.
T. Broadhead, Soonderbunds, (not a member,)	As many as can be spared.
Lieut. Bigge, Gowhatti,	3 beegahs.
Dr. Roe, member of the Comillah Society,	8 ditto.
H. Graham, Kishnaghur,	2 ditto.
Dr. G. Lamb, Dacca,	2 ditto.
J. D. Herklots, Berhampore,	2 ditto.
Baboo Shree Kissen Sing,	1 ditto.
W. Storm,	10 ditto.
George Taylor, (Tirhoot,)	×
W. F. Gibbon, Goruckpore,	As many as possible.
Thos. Savi, Kishnaghur,	×
W. H. L. Rainey, Jessore,	As many as can be given.
P. Sutherland, Midnapore,	5 beegahs.
Dr. Helfer, Tenasserim,	×

The Secretary's reply to Messrs. Fergusson, Brothers and Co.'s application was also read, stating that he required the sanction of the Meeting to record an application that had come in after the 1st October.

Proposed by Mr. Hare, seconded by Mr. Bell, that, under the circumstances stated, the following gentlemen be added to the list, viz.

W. F. Fergusson,	} Jaunpore, .. x
Colin Campbell,	
Thos. Holroyd,	
J. H. Leighton,	

Memo.—The mark x denotes no fixed quantity.

The Secretary submitted a letter which he had addressed to the President, supposing Sir E. Ryan would have been present, explaining that the cultivation of sugar-cane for distribution, had cost more than was at first contemplated, owing to the heavy land carriage between Jubulpore and the river, and hoped that a small charge might be made upon all canes distributed to Members, although they were virtually entitled to them *gratis* by the Resolutions previously passed by the Society and advertized; suggesting that one anna per cane be the rate at which supplies be distributed to Members, and that this arrangement would relieve the majority of Members, from bearing an expense on behalf of the few who required canes for cultivation, as an article of profit, making an exception only in favor of Branch Societies, whose object is disinterested.

Proposed by W. F. Fergusson, Esq. seconded by Dr. Strong, that with reference to the great expense incurred by the Society in keeping up a cane plantation, it is proposed that for all canes distributed from the Society's Nursery a charge be made of one anna per full length cane, and that after all applications from Members are satisfied, the remainder be distributed to the public at such rate as has been already fixed by advertisement, viz. 8 rupees per hundred canes.—Carried *nem. con.*

The Secretary requested the sanction of the meeting to pay the amount of Capt. Brown's memorandum of costs for sugarcanes, as per his letter of 20th September, and that of Mr. Landreth for American vegetable seeds, as per Dr. Huffnagle's letter of the 17th September.

Proposed by C. K. Robison, Esq., seconded by Dr. Wallich, that these amounts be paid.

The thanks of the meeting were ordered to be offered for all the foregoing communications and presentations.

JOHN BELL, *Secretary.*

Town Hall, Calcutta, Oct. 10; 1838.

PROCEEDINGS OF THE AGRICULTURAL
COMMITTEE.

A meeting of the Agricultural Committee took place at the Town Hall, on Monday morning the 3rd September, 1838.

Present.

Messrs. W. Storm, Charles Huffnagle, Thos. Leach, W. F. Gibbon, and John Bell.

Read a letter from Mr. Balestier of Singapore, dated 11th July, 1838, (which had been received by the Secretary a few days before,) intimating that he had despatched two varieties of canes*, and a small sample of Muscovado sugar, to be presented to the Agricultural Society.

Proposed by Dr. Huffnagle, seconded by Mr. Storm, that the Secretary be directed to send them to Dr. Wallich, with a request that they may be placed in a hopper in the Society's nursery.

Proposed by Capt. Leach, seconded by Mr. Gibbon, that the committee do meet at the nursery on Wednesday morning the 5th inst. at 6 o'clock, in order to prepare a report for the next General Meeting.

Wednesday, September 5, 1838.

In conformity with the last proposal in the Report of the 3rd September, the Committee met at the Society's nursery on Wednesday morning the 5th September at 6 A. M.

Present.

Dr. Wallich, Messrs. C. Huffnagle, W. Storm, W. F. Gibbon, Thos. Leach, and John Bell.

The Sugar-canes are most flourishing.

The canes sent up by Mr. Balestier from Singapore are fine specimens, averaging 10 feet in length from the stem to the uppermost joint.

The Committee are of opinion that there can be no doubt as to the longest-jointed cane being the identical Otaheite cane. The "Egg" cane, although more jointed, is a fine specimen, and as far as appearance warrants is equal to the first in size and adaptation for

* Bundle No. 1, variety called in the Malay language *Taboo Telor*, or Egg cane. Bundle No. 2, variety which Mr. Balestier considers identical with the "Tiste" cane.

sugar. The Committee expect that very few of those* now received will vegetate, from having been loosely packed instead of being closely bound round with straw-bands but have determined to plant out half of these at once, and place the other half in hopper, to see which mode answers best.

Dr. Wallich having represented that it is necessary to maintain an efficient person to see the Committee's orders carried into effect, the Committee authorize Dr. Wallich to engage an intelligent native who shall have a practical knowledge of Horticulture, and who can keep the nursery books in English, and if these qualifications cannot be found combined in one individual, to engage a writer and trustworthy sirdar over the mallees and labourers, for the purpose of keeping a journal of receipts, deliveries, and operations generally, and carrying into effect the orders issued from time to time by Dr. Wallich, or the visiting Committee.

Resolved,—That in future the Committee sub-divide themselves into three Sections, to visit the nursery alternately,—and that on each occasion they shall enter any remarks or suggestions that occur to them, in a rough journal, which shall be kept on the spot,—such remarks to be signed by members writing them, with dates of visits, &c.

Resolved,—That with a view to carry the above resolution into effect,—Dr. Wallich and Mr. Bell do visit the nursery for the present month, *September*;—that Dr. Huffnagle and Mr. Storm be the visiting section for the month of *October*, and that Messrs. Leach and Gibbon act for the month of *November*.

Resolved,—That this subsidiary arrangement shall not interfere with a full Committee Meeting whenever such may be appointed among the Members.

(Signed)

WM. STORM,
W. F. GIBBON,
THOS. LEACH,
CHAS. HUFFNAGLE,
N. WALLICH, M. D.
JOHN BELL.

* 12 of each or in all 24 canes.

NOVEMBER 14, 1888.

Agricultural Society of India.

A General Meeting was held in the Society's Apartment, Town Hall.

Present.

The Hon'ble Sir E. Ryan, President, in the Chair.

Messrs. C. K. Robison, A. Colvin, D. Hare, Chas. Huffnagle, Baboo Sreekissen Mullick; Messrs. G. A. Prinsep, R. Campbell, D. McPherson, W. Speir, A. Harris, D. C. Low, W. F. Gibbon, Jas. Stewart, W. K. Ewart, A. A. Dunlop, F. L. Beaufort and Dr. Wallich.

Dr. Wallich intimated, that in consequence of Mr. Bell's illness, he had been requested to act for him at this meeting.

The proceedings of the last Meeting were read and confirmed.

MEMBERS ELECTED.

The following gentlemen, proposed at the October Meeting, were elected members of the Society; viz.

W. F. Campbell, Esq., Major R. Becher, A. A. Dunlop, Esq., Alexander Stewart, Esq. M. D., and Geo. Teil, Esq.

MEMBERS PROPOSED.

The following gentlemen were proposed as members :—

John Lyall, Esq., proposed by the Secretary, and seconded by Dr. Wallich.

Dr. J. W. Helfer, proposed by the Secretary, and seconded by Dr. Wallich.

Robert Watt, Esq., Dacca, proposed by the Secretary, and seconded by Dr. Wallich.

C. Steer, Esq. C. S., proposed by the Secretary, and seconded by Dr. Wallich.

F. Bellairs, Esq., proposed by the Secretary, and seconded by Dr. Wallich.

W. McDowall, Esq. Kishengunge, Rungpore, proposed by the Secretary, and seconded by Dr. Wallich.

A. Bryce, Esq. Belnabarry, Jessore, proposed by the Secretary, and seconded by Dr. Wallich.

John Cowie, Esq., proposed by A. Colvin, Esq., and seconded by the Secretary.

Thos. Latter, Esq. 67th Regt. N. I., proposed by Dr. E. W. Clarributt, and seconded by the Secretary.

J. P. Hermanson, Esq. Rungpore, proposed by T. H. Gardiner, Esq., and seconded by Dr. Wallich.

Jas. Cowell, Esq., proposed by the Secretary, and seconded by D. B. Syers, Esq.

S. Finch, Esq. Goruckpore, proposed by the Secretary, and seconded by A. Colvin, Esq.

R. DeCourcy, Esq. Hurrah, Kishnaghur, proposed by the Secretary, and seconded by W. Storm, Esq.

J. Meliss, Esq. Nautpore, Purneah, proposed by Charles Huffnagle, Esq., and seconded by Dr. Wallich.

P. J. Sarkies, Esq., proposed by Charles Huffnagle, Esq., and seconded by G. A. Priusep, Esq.

Capt. Wm. Allen, proposed by W. F. Gibbon, Esq., and seconded by W. K. Ewart, Esq.

MOTION OF WHICH NOTICE WAS GIVEN AT LAST MEETING.

Mr. Bell's motion, to present a gold medal to the Commander of the French ship *Alcide*, for having been the first successful importer of the true *grana fina* from Bourbon, was brought forward, and carried unanimously.

Dr. Wallich brought to the notice of the Meeting the injury which the Society's sugar-cane plantation had sustained by the late storm; and stated, that with the sanction of the Committee, and in accordance with the Secretary's advertisement, such portion of the cane as was broken and laid, had been distributed without loss of time.

Dr. Wallich also drew attention to a minute of the Agricultural Committee, who had visited the nursery on the 12th instant, recommending that the cane, the whole of which has now arrived at maturi-

ty, be distributed immediately to the applicants whose names have already been registered, instead of delaying its disposal till December next, as originally proposed.

The sense of the Meeting having been taken, as to the recommendation of the Committee, it was resolved that it be adopted.

In connexion with the subject, the President proposed, and it was resolved—"That it be referred to the Sugar Committee to consult and report at what periods it would be desirable the canes in the Society's nursery should be cut hereafter."

(On the departure of the President, at this period, the chair was taken by Mr. Robison, V. P. :)

Read the report of the Committee appointed by a resolution of the Society, passed at a General Meeting on the 12th September last, to revise the conditions on which medals shall be offered for encouraging improvement in the staple products of India, for the ensuing year.

In consequence of a difference of opinion among the members of the Committee, with respect to the *description* of *sugar* for which medals shall be offered, it was, after some discussion, moved by Mr. Hare, seconded by Dr. Huffnagle, and resolved,—That the report be confirmed with the word "*unrefined*," substituted for "*Muscovado or raw*," in the 1st and 2nd prizes for sugar*.

COMMUNICATIONS.

The following communications were read :—

From Dr. K. M. Scott, Secretary to the Agricultural Society of Assam, dated Gowhatti, Oct. 29th, 1838, returning thanks to the parent institution, for the offer conveyed in the Secretary's letter of the 5th June last, to award medals and prizes to encourage the growth of European vegetables in their district.

Enclosing a copy of the regulations of their Society and of proceedings of a Meeting held on 16th of August, 1838, and with reference to the 4th resolution passed on that occasion, advises despatch of six specimens of grain for this Society.

From T. O. Crane, Esq. Secretary to the Agricultural Society of Singapore, dated October 9th, transmitting a box of Mangosteen plants.

* For a copy of this Report, see page 5.

From Messrs. Willis and Earle, enclosing a note from J. Finch, Esq. of Tirhoot, and forwarding eight English Apple grafts, presented by that gentleman for the Society's Fruit-tree nursery.

From Captain O. Bell, dated Prince of Wales' Island, 8th September, 1838, transmitting two boxes, containing several varieties of fruit trees.

From T. H. Maddock, Esq., presenting a few seeds of a pear tree, which flourishes in Nepal and Tirhoot.

From H. Piddington, Esq., dated Chandernagore, 12th Nov., presenting a cob of a fine description of maize grown at Bourbon—termed "*mais rouge*."

From Dr. Wallich, dated October 24th, presenting to the Society, on behalf of Major Archer, a quantity of a bean called "*pois noire*," the produce of the Mauritius, much valued in that island, as an excellent fodder for cattle.

From Messrs. W. and J. Noble, dated London, May 29th, 1838, acknowledging receipt of Secretary's letter of the 12th of January last, enclosing an order for the despatch of a trial assortment of vegetable and flower seeds, and stating that the order reached too late to enable them to transmit the seeds so as to have arrived by the period to which they were limited,—viz. the 1st of September; also requesting to be informed if an assortment may be prepared for the Society, for the next season.

From Jas. Cowell, Esq., enclosing extract of a letter to his address from a resident of Jamaica, dated June 23rd, 1838, which gives some information as to the mode adopted in the West Indies, for the culture of ginger.

From E. A. Blundell, Esq., dated Moulmein, October 2nd, mentioning the safe arrival of the plants and seeds lately forwarded. Gives a short account of the cultivation of rice, which is the only species of grain grown in those parts.

From Captain H. MacFarquhar, dated Tavoy, September 21st, 1838, promising to transmit some specimens of gamboge, collected from trees growing in abundance at that province. States, that the specimen of cotton lately forwarded to the Society, is the produce of *Sea Island* seed, and not of *South Sea Island* seed, as mentioned in a former letter.

From J. W. Payter, Esq., dated October 16th, forwarding a few

Pods of cotton grown in 1837, from New Orleans' seed received from the Society.

From Dr. J. W. Helfer, dated October 12th, acknowledging receipt of an assortment of seeds for introduction in the Tenasserim Provinces.

From Dr. Wise, Secretary to the Branch Society of Hooghly, intimating their wish to accept of the medals and prizes offered to encourage the growth of European vegetables.

From Colonel L. R. Stacy, dated Dacca, October 14th, promising to send a quantity of the seed of a variety of African grain.

The following proposition was moved by Mr. Harris, seconded by Mr. D. McPherson, viz.

“That half an anna be the price of each Otaheitan cane, instead of one anna, as fixed at the last Meeting of the Society.”

On being put to the vote, the above proposition was negatived.

The thanks of the Meeting were ordered to be offered for all these communications and presentations.

N. WALLICH, M. D. *for the Secretary.*

REPORT OF THE MEDAL COMMITTEE.

The Medal Committee having been requested by a resolution of the Society, at a meeting held on the 12th September last to revise the conditions on which premiums are to be offered for encouraging improvement in the staple products of India, for the ensuing year, —now beg to submit the form of an advertisement framed for the current year, which, as the year is already far advanced, they recommend may be accompanied with an intimation that the same premiums and conditions will be renewed on the ensuing year.

The Committee have thought it expedient to limit the medals to the Bengal Presidency, the Madras and Bombay Presidencies having independent Societies of their own. They have also considered it unnecessary any longer to extend these premiums to the Straits Presidency, where a separate Agricultural Society likewise exists, and where from difference of climate, the same motives to offer rewards for the cultivation of particular articles do not present themselves, a species of cultivation being perhaps easy at Singapore or Penang,

which in Bengal may be attended with physical difficulties, and vice versâ.

The committee think it necessary to state, that one of their members, Mr. G. A. Prinsep, is of opinion that the medal for sugar should not be limited to sugar made from one boiling and chrystallization as in the West Indies, but be offered generally for the best manufacture from the juice of the cane.

(Signed) C. K. ROBISON,
W. CRACROFT,
G. A. PRINSEP.

Medals for encouraging improvement in the staple products of Bengal.

At a General meeting of the Agricultural Society of India held on the 12th September, 1838, it was resolved to renew the premiums offered under a resolution passed on the 12th April, 1837, to the producers of the best staple products, for another year.

1.—SUGAR.

For the best sample of Muscavado or *raw Sugar*, made from the juice of the sugar-cane, not less than 2 maunds—*The Gold Medal*.

For the second best sample of Muscavado, or *raw Sugar*, made from the juice of the sugar-cane, not less than 2 maunds.—*The Silver Medal*.

2.—SILK.

For the best sample of Silk, not less than 2 seers.—*The Gold Medal*.

For the second best sample of Silk, not less than 2 seers.—*The Silver Medal*.

3.—COTTON.

For the best sample of Cotton raised from foreign seed, not less than 2 maunds.—*The Gold Medal*.

For the second best sample of Cotton raised from foreign seed, not less than 2 maunds.—*The Silver Medal*.

4.—TOBACCO.

For the best sample of Tobacco, reared from foreign seed, not less than one maund.—*The Gold Medal*.

For the second best sample of Tobacco, reared from foreign seed, not less than one maund.—*The Silver Medal*.

CONDITIONS.

1st. The articles exhibited by candidates for medals must be the produce of the Bengal Presidency.

2nd. The competition will be open to all persons whatever without distinction.

3rd. The articles must not be garbled, but bonâ fide, the average produce of the land on which they are grown, or of the manufacture.

4th. All candidates for medals must deliver along with their specimens, statements of the places where the articles were produced, the quality or nature of the soil and of the mode of cultivation and manufacture, and the cost of production.

5th. A moiety of the specimens which shall be declared entitled to the *Gold Medals*, shall be the property of the Society; the remainder will be returned to the candidates.

6th. Candidates are requested to affix to their specimens a number or mark, and to accompany them with a sealed letter, and to mark the letter addressed to the Secretary with the words "Competition letter," which letter will not be opened till after adjudication.

7th. When two or more samples shall be considered to be of equal quality the premium will be awarded to the sample which may appear to have been raised at the least cost, and with reference also to the greatest quantity produced upon a given area.

8th. All candidates are expected to leave their specimens in the possession of the Secretary of the Society, on or before the 1st May, 1839.

DECEMBER 12, 1838.

Agricultural Society of India.

A General Meeting was held in the Society's Apartment, Town Hall.

Present.

The Hon'ble Sir E. Ryan, President, in the Chair.

Messrs. W. Cracroft, D. Hare, G. A. Prinsep, Charles Huffnagle, and Dr. Spry; Messrs. R. J. Bagshaw, T. Brae, C. Trebeck, M. Staunton, R. S. Strickland, A. Harris, D. W. Speed, A. Porteous, W. F. Dowson, A. Grant, T. H. Gardiner, R. Campbell, C. K. Robison, Dr. Wallich, and a few other members.

MEMBERS ELECTED.

The following gentlemen proposed at the last meeting were elected Members of the Society ; viz.

Dr. J. W. Helfer, Messrs. John Lyall, Robt. Watt, Chas. Steer, F. Bellairs, W. McDowall, A. Bryce, John Cowie, Thos. Latter, J. P. Hermanson, James Cowell. S. Finch, R. DeCourcey, James Meliss, P. J. Sarkies and Captain William Allen.

MEMBERS PROPOSED.

The following gentlemen were proposed as Members :

J. Gilmore French, Esq , (Dacca,) proposed by Mr. C. K. Robison, and seconded by Mr. W. Cracroft.

George Buckland, Esq , (Porrundah, Purnea,) proposed by Mr. C. K. Robison, and seconded by Mr. A. Porteus.

J. Marquis, Esq., (Mohungunge, Pubnah,) proposed by Mr. C. K. Robison and seconded by Dr. Wallich.

Joshua Athanass, Esq , (Meerut,) proposed by Mr. H. Cope, and seconded by Mr. Robison.

Gilson Rowe, Esq., (Chunarandee, Jessore,) proposed by Mr. Thomas Brae, and seconded by Mr. George Austin.

Charles Dubordieux, Esq., (Dowlutpore, Jessore.) proposed by Mr. Thomas Brae, and seconded by Mr. George Austin.

The President addressed the meeting on the great loss which the Society had sustained by the death of its Secretary ; and after commenting on the exemplary zeal and ability so conspicuously displayed by the late Mr. Bell, in conducting the affairs of this Society, drew attention to a motion which he felt convinced both the Members now present, and the Society at large, would recognize as a tribute justly due by the Society, to the memory of one, who had so materially contributed to its prosperity.

The President accordingly proposed, seconded by Dr. Wallich, " That the Society receives with feeling of the deepest regret, the intelligence of the death of their late most able and indefatigable Secretary Mr. John Bell. That during a period of nearly four years that he has filled the office of Secretary to the Agricultural and Horticultural Society of India, the $\alpha\delta\eta\lambda$, intelligence and ability which he has displayed, have been the means of raising the Society to its present state

of prosperity and usefulness. The Society in thus recording their opinion can only express their anxious hope, it may be possible to procure a successor equally competent and zealous."—Carried *nem. con.*

The President having explained that Messrs. Robison and Wallich had, at his recommendation, undertaken to act conjointly as Secretaries to the Society, until the anniversary elections of office-bearers next month, gave notice of the following motion, seconded by C. Huffnagle, Esq.

"That the sum accruing in the hands of the Treasurer to the Society, from the period of the death of our late lamented Secretary to the appointment of a successor, be presented to the widow of the late Mr. John Bell, as a slight token of the deep sense which the Society entertains of the indefatigable exertions of its late Secretary, to promote the interests and prosperity of the Society "

Proposed by Dr. Wallich, and seconded by C. Huffnagle, Esq. "That as a further mark of respect to the memory of our late lamented Secretary, all further business of this meeting with the exception of some matters which require immediate attention, be deferred, and that this meeting be adjourned."

Carried unanimously.

The Acting Secretaries having suggested the expediency of a Committee being now appointed, to examine into the state of the Society's collections and finances, and report the result to the next meeting of the Society; the President proposed the following gentlemen as the Members of the Committee: Messrs. G. A. Prinsep, W. K. Ewart, and W. F. Gibson; and they were chosen by the meeting.

Read a letter from the Secretary to Government in the General Department, dated 28th November, 1838, enclosing copies of a letter from the Honourable Court of Directors, dated 17th August, and of several communications to them from the Committee of Agriculture and Commerce of the Royal Asiatic Society; the object of which, is to obtain and lay before the public at home, information as to the nature of the most ordinary productions of India, and their prices, both in the interior and on the sea coasts; as well as of the other productions, of which the knowledge is not yet developed.

With the view of meeting the wishes of Government to be favoured with the Society's suggestions, as to the best mode of obtaining the information required by the Royal Asiatic Society, it was proposed by the President, seconded by W. Cracroft, Esq., that the fol-

lowing members be requested to form themselves into a Committee, for the purpose of reporting to the Society, what should be the proper steps to be adopted on this occasion ; viz.

Messrs. R. Walker, H. M. Parker, W. K. Ewart, G. A. Prinsep, W. P. Grant, and Dr. Spry.

Mr. G. A. Prinsep produced before the meeting a Cactus Plant, with the Cochineal insect upon it in a live state, which he had recently received from England by the ship *Duke of Bedford* ; and stated that it appeared from letters addressed to him by Dr. Royle and Mr. Wilson Sanders, that the insect had been procured at their solicitation, with the assistance of Mr. Anderson of Chelsea, from the garden at Claremont, where it had been introduced from Mexico and sent out under charge of Mr. Henry Barchard. It was ordered that the Silver Medal be presented to Mr. Barchard, in conformity with the late resolution of the Society.

C. K. ROBISON,

N. WALLICH,

V. Ps. and Joint Offg. Secretaries.

ON THE CLASS AND POWER OF DRAFT CATTLE IN INDIA.

[When Lord William Bentinck was about to resign his government of India the Society were favored by him with a suggestion, recommending the introduction of the *high-wheeled Cart of Madras* for general purposes of Agriculture in Bengal. On this occasion the Society ordained; that a Committee be selected out of the body of their members who should take the subject into their consideration and report on the feasibility of the advice thus proffered. The report of the Committee is to be found in the 2nd Volume of Transactions, but the valuable practical collateral information touching the class and power of draft cattle in India, which accompanied the sentiments of the Committee and on which the report was based, were not printed. To meet, as far as they are able, the application recently made to the Society by the Royal Asiatic Society of Great Britain and Ireland contained in the following resolution, the letters of Major Parsons and Colonel Skinner are now printed.—H. H. S.]

Extract from the Minutes of the Committee of Correspondence of the Royal Asiatic Society, 29th of August, 1837. The Right Honorable Sir Alex. Johnston, in the Chair.

RESOLVED,

“That inquiries be instituted into the various breed of oxen used in India. The Committee wished that a particular investigation

should be made of the following sorts :—the wild bullocks found in the countries near the Malabar Coast ; the fine breed of cattle used in the Mysore country by Tippoo for drawing his great guns ; the large breed of oxen in Guzerat, and the little Purneah bullocks of Bengal, and that any information should be obtained regarding all the other descriptions of bullocks used in the different parts of India.”

A true extract,

(Signed) EDWIN NORRIS,

Assistant Secretary.

Extract from a letter of Captain Parsons, Superintendent of the Government Stud at Hissar, to the Secretary of the Agricultural Society of India, dated 27th April, 1835.

“ I have the pleasure of your letter of the 14th instant, and most willingly hand you some information respecting our Cattle Farm, and shall be happy to hand you any other that is in my power. I am much inclined to think that a *large* breed or description of cattle would not thrive in Bengal, for as the cattle of that part of the country are by nature small, I think it very clearly points out, that there must be something in the soil and climate, unfavourable to the development of great size,—therefore I think that large cattle will deteriorate without improving the smaller breed,—indeed for cattle to improve when *transplanted*, it is necessary they should be removed to where the soil and climate are superior to the place from whence they came: however there is nothing like actual trial for proof. The Mysore cattle, though very active and blood-like in appearance, are much too slight and low for the guns, but of their kind, they are an excellent description of cattle ; still I hardly expect that any *crossing* will increase their *bulk* much, though at present it is impossible to say: however they shall have fair play here, and every advantage possible, to see if any thing can be made of them.”

“ P. S. Upon reflection I think it very possible that a cross of the Mysore cattle would be the very thing for Bengal, for though small they possess great activity and spirit, and work well,—indeed Lord William considered them amongst cattle, what the Arab is amongst horses, and though they are not adapted for ordnance purposes (for want of height and substance), yet for light draft and wells they would be admirable.”

Memorandum, enclosed in Capt. Parson's letter of the 27th April, 1835.

1. The cattle employed at the Hurriannah Establishment consist of the Nagore, Guzeerat, Angole, Hurriannah, Sinda and Mysore breeds; the qualities of the Nagore breed are height, substance and speed: of the Guzeerat, height, greater substance but of a duller disposition than the Nagore. The Angole has height and very great substance, can endure great fatigue upon coarse food, and lives to a great age. The Hurriannah can endure great fatigue upon coarse food, but has not the height or substance of the former breeds. The Sinda has great substance, but is low and lazy. The Mysore is strong and active for its size, but is too low for ordnance purposes.

2. The crosses made from the above breeds, are the Nagore, Hurriannah; Guzeerat, Hurriannah; Nagore, Sinda; Angole, Hurriannah; Sinda, Angole; Nagore, Sinda, Angole; Guzeerat, Nagore, Hurriannah; Nagore, Angole; Guzeerat, Nagore, Angole; Angole, Nagore, Sinda; Angole, Guzeerat, Hurriannah; and Angole, Guzeerat, Nagore, Hurriannah; the most successful crosses are from the Nagore, Guzeerat, and Angole bulls, which are the only bulls now kept. The best draught cattle are from the Nagore; Angole, Guzeerat, Hurriannah; Angole, Guzeerat, Hurriannah; and the Guzeerat, Nagore, Angole, crosses; the latter promises to be the best cross we have made. The only cross tried with the Mysore cattle, has been with the Nagore bull, and their produce now in the farm vary in age from one to eight months, they are much superior to the pure Mysore breed, and equal in height to the crosses of the Nagore and Guzeerat bulls by the Hurriannah cow, but have not so much substance, and apparently will only be adapted to light and active work.

3. The young bull is fit for duty at three years old, the custom of the country varies from two to four years.

4. The male produce of the farm are castrated at three years old, experiments have been made at one year, one and a half years, two years, and two and a half years old, but the former has been found to answer best; the custom of the country is at three years old.

5. Calves are separated from their mothers at from seven to nine months old agreeable to their condition, and the season of the year; those intended for the service remain with their herd until five years old.

(Signed) J. D. PARSONS,

S. H. E.

Extract from the Report of Capt. Parsons, Superintendent, Hisar Establishment, to the Commissary General, upon experimental Cattle, received from Mysore, dated August 18, 1832.

(Communicated in a letter from Colonel Beatson, Commissary General, to the Agricultural Society of India, dated 12th May, 1835.)

“The cattle are small and slight, and very inferior in general appearance, size and substance to any of our farm cattle, or to the common description of cattle of this part of the country. I consider them quite unfit for ordnance purposes, (unless when the better cattle are not procurable,) for they have not sufficient height, or that general substance and weight without which neither horses nor horned cattle are calculated for heavy draught. There are 27 bullocks stated in the return to be now fit for transfer to the service, and though they are rising seven years of age, or more (which is two years older than our own farm cattle, are transferred to the service); only three of them are the regulated height (of 52 inches) for draught cattle, 3 of 52 inches. and 16 out of the 27 are not even 50 inches; the 2 of 51 ditto. height fixed for carriage-bullocks: (their several 6 of 50 ditto. heights are inserted in the margin,) and as the cattle 1 of 49½ ditto. are stated to have been selected with great care, and 10 of 49 ditto. from the best herds, it is to be supposed that the 27 2 of 48¾ ditto. bullocks must be a favorable specimen of them.”

“The Mysore cattle are said to be possessed of great activity and endurance, and admitting that they are, I hope the same qualities will be allowed to our farm cattle, as they certainly do possess them; and with the additional (and indispensably necessary) ones, of height and great general substance;—therefore to keep the Mysore cattle here, when so many of them will not be fit even for carriage-bullocks; besides the necessity for keeping them so much longer at the farm, before they are fit for transfer to the Commissariat (for the five years old bullocks are not to be compared to the farm bullocks of three years old, either in height, strength, or general appearance) will, I think, be attended with loss and disappointment to Government, and be a heavy and useless expense to this establishment.

“I may here also remark that at the Madras Presidency the proportion of bullocks for ordnance purposes is (I understand) as follows—To a 24 pr. 50 bullocks,—an 18 pr. 44 bullocks; and a 12 pr. 36 bullocks; whereas here there are only 26 bullocks to a 24 pr.; 22 bullocks to an 18 pr. and 18 bullocks to a 12 pr., consequently, if the Mysore bullocks were even to attain the regulated

height, double the number of them would be required for the guns, and thus cause a double expense.”

Extract from a letter of Col. Skinner to the Secy. of the Agricultural Society of India, dated Hansi, May 13, 1835.

“I regret my inability of giving you the sort of information you require ; for I have never seen the large Mysore cattle which you allude to, and am therefore, unable to pass an opinion as to whether their introduction, and intermixture, with the Bengal breed, as recommended by Lord William Bentinck, would produce such efficient cattle, as are required for the general service of the state ; however, from what I have seen of the smaller kind of the Mysore cattle, which were sent to Hissar in 1831, I must confess that they appear to have more blood than any of the Hindustani breed. Their size was considered a very great objection against them, and on which account, they were sold off by outcry, having been considered as too small for general service ; I purchased a number of these cows, as I am firmly of opinion, that the 3rd or 4th cross with the Nagore will produce a far superior breed than what we now have in the country. The Mysore cattle merely want substance, as they are otherwise not deficient in any point, and appear to have far greater animation in them than our country breed. I therefore think, that if the *larger* Mysore cattle are introduced into Bengal that their intermixture will produce a very efficient breed after the 3rd or 4th removal. My opinion, of course, can have little benefit, as it is only founded on conjecture and what I have seen of the smaller kind. I have now a great many young cattle in my farm, the produce of Mysore cows, from Nagore bulls, and they are very promising : however, I do not conceive myself competent to form a decisive or satisfactory opinion until I have seen the third generation, as they must be, thus far removed from the original, before they can acquire the same degree of substance, for which our Hurrianah breed are so proverbial.”

R E P O R T
OF THE
AGRICULTURAL AND HORTICULTURAL SOCIETY
OF INDIA,
FOR THE YEAR MDCCCXXXVIII.

THE addition of another year to the career of the Society calls for the usual exposition of the affairs of the Institution.

This duty is a pleasing one, for no body can be in more prosperous circumstances or in the enjoyment of greater popularity. This is only what might have been expected when the public attention was once properly directed to the many vast objects of utility which it is the business of the Society to promote. The scheme of the Agricultural and Horticultural Society of India is catholic in its province. Its aim is the prosperity of the nation by effecting the amelioration of the present low condition of the people through the improvement of the agricultural wealth of the land.

Thus every friend to India whether he be the man of commerce the tropical agriculturist, the private gentleman, the clergyman, the soldier, the lawyer or the physician, has, as it were, an interest more or less direct, in assisting in promoting the attainment of the great ends which are held out to the expectation. When, therefore, we are told that as many as one hundred and forty-eight members joined the ranks of the Institution in one year, and one hundred and twenty in another year, while the body of members must feel grateful for this unwonted acquisition of strength and striking proof of confidence, there is no reason to doubt that new friends will continue to pour in to enable the Executive to perform not only all that has hitherto been promised, but to extend the sphere of usefulness in a still greater range.

The Agricultural and Horticultural Society of India now numbers *four hundred and twenty members*, two hundred and sixty of whom, or more than one-half, have been added with in the last twenty-four months.

The classification of the entire body is as follows :—

	Former years.	Year 1837.	Year 1838.	Total.
Civilians and others in Civil employ,	46	41	11	98
Merchants and others engaged in commerce, Indigo planters and other tropical agri- culturists,	25	36	24	85
.	25	21	43	89
Military officers,	34	17	18	69
Medical,	14	16	10	40
Asiatics,	13	9	7	29
Law officers,	14	5	1	20
Europeans of no particular profession, . .	6	0		14
Clergymen,	5	2		9
Honorary members,	6	1		7
	188	148	124	470

The gross total is thus shewn to be 470, but a deduction of 50 is required to be made for lapses, which leaves the actual number of members now on the books of the Society at 420. Of these 332 are paying members. In thus analysing the state of the Society, for the past two years, the Indigo planters are found to double in numbers that of any other class of associates. This circumstance is one of great importance and gratification, for when it is considered that through their exertions solely has the particular article of Indigo been brought to its present state of perfection so as to be unrivalled in excellence, it is not too much to anticipate that cultures of equal consequence to the country will, in a few more years, be brought to like perfection. There is nothing to prevent it—enterprise and capital are all that are required, and the time will come when the cotton, the sugar, the coffee and the tobacco of India must take their places in the list of best priced staples imported into the mother-country.

One source of regret alone requires to be noticed, and that is the apathy which continues to be shown to the labours of the Society by influential Asiatics. The few who have allied themselves with their European brethren, if we may judge from their neglect in attending the meetings, care little about its concerns; but this possibly arises from a want of ability properly to appreciate the utility of the Institution and to create which will require another generation.

During the past year twenty-one members have been lost to the Society,—ten by death, and eleven by resignation, four being in consequence of departure for Europe.

Among the calamities which has befallen the Society by the hand of death the loss of the late Secretary has been the most painful. No tribute of posthumous respect for his invaluable services can sufficiently express the debt of gratitude which the Society owe, to the name of John Bell. In the space of three years, from a state of most sickly debility, he established, in the economy of the Society, a healthful condition, and eventually a most luxuriant vigour. To his personal exertions the interest that has been created in the public mind regarding the concerns of the Society may be said to be altogether due. He was unsparing in his labours which were carried on with that untiring zeal which is sure to command success. Had his life been spared his previous management is an earnest of what might have followed, and the Society are left to deplore with unmingled feelings of regret the incalculable loss which they have sustained.

A gentleman whose exertions in the early career of the Society gained for him the distinction of *Honorary* election is also to be found among the list of the deceased. Sir Robert Colquhoun, Bart. was one of the warmest of the friends of the Society and it is therefore with deep regret that his loss is recorded.

The remaining names taken from the Society's ranks are Nathaniel Halhed, Esq., F. Campbell, Esq., A. Dobbs, Esq., Jas. Cock, Esq., F. T. Fergusson, Esq., Wm. Jackson, Esq., Capt. Smallpage and Henry Freeth, Esq.

Turning from the contemplation of this affliction the Society would beg to draw attention to the chief subjects that have engaged their attention during the past year. First in the list, from its early occurrence, are the steps that were taken to investigate and call members to a consideration of the present condition of the breed of cattle in India. Some highly interesting communications were received, especially from the Agricultural and Horticultural Society of Western India, to facilitate the transmission of which to the Committee of Agriculture and Commerce of the Asiatic Society of Great Britain and Ireland, who had applied for information on this head, copies were ordered to be printed in a separate form. Further, to assist in the propagation of a finer race of cattle, the Society has established a Committee under whose direction a handsome schedule of rewards has been voted out of the funds as an encouragement to individuals to

import foreign cattle into India. The first exhibition of this nature will occur on the 1st February*.

Much useful information connected with the varieties in the breed of the indigenous cattle of Asia remains to be collected and this opportunity is taken for making an urgent appeal to every person who can furnish information to come forward and assist the Society with their contributions.

The next object which engaged the attention of the Society has been the propagation of the Otaheite sugar-cane for distribution in the provinces of Lower India, and for this purpose, through the co-operation of Dr. Wallich the superintendent of the Botanic Garden, one of the Vice-Presidents of the Society, and the Nursery Committee, twenty-two cases of cane from the isle of Bourboon, four cases from Singapore, and 2,047 canes from Jubulpore have been added to the stock of last year, which altogether has yielded a harvest that has enabled the Society to supply as many as thirty-four thousand, two hundred and sixty-six canes† to different applicants from various parts of Lower Hindustan. The ratoon crop of next year will again be available for distribution, and in this manner the conti-

* The award has since been made, and the result was as follows :

To Mrs. Pattle, premium of 250 Rs. and the Society's *Silver Medal* for the best bred Cow imported from any part of the world.

To W. F. Gibbon, Esq. a premium of 200 Rs. and the *Gold Medal*, for the best woolled Merino Ram, not less than two years' old.

To W. F. Gibbon, Esq. a premium of 150 Rs. and the *Silver Medal*, for the second best woolled Merino Ram, not less than two years old.

† Moulmein,	..	..	..	..	..	100
Sunderbuns,	..	..	..	..	..	500
Kishnaghur,	..	..	..	..	..	50
Berhampore,	..	..	..	..	..	400
Midnapore,	..	..	..	..	..	1,000
Benares,	..	..	..	..	..	2,000
Assam,	...	..	..	..	..	1,200
Jaunpore,	..	..	..	..	..	5,000
Howrah,	..	..	..	..	..	64
Twenty-four Pergunnahs	..	..	..	..	..	4,750
Dacca,	..	..	..	..	..	650
Calcutta,	..	..	..	..	..	800
Dacca,	..	..	..	..	..	2,150
Hazareebagh,	..	..	..	..	..	600
Hooghly,	..	..	..	..	..	4,080
Colvin and Co.	..	..	..	..	..	4,940
Bogra, (Dinapore),	..	..	..	..	..	200

nued supply of this beautiful variety of sugar-cane can be maintained, till the general prevalence of it throughout the country will render a nursery no longer necessary.

The third great object, as it stands in its order of occurrence, is the attention which has been paid to the introduction of the fine-grained cochineal insect into India. The mass of valuable facts which the late Secretary brought together to assist in the establishment of this enterprise will be found recorded in the Transactions of the present year, and the liberal distribution of the Society's gold and silver medals to the successful importers of the insect will sufficiently attest the deep value the Society has set on the efforts of all who have enlisted themselves in the pursuit.

In addition to the twelve former Branch Societies, two additional ones have been formed during the year; one through the personal exertions of Lieut. Colonel Stacy at Dacca, and the other through the influence of General Sir Thomas Anburey at Saugor. Branch Societies form so many *centres*, as it were, of support to the efforts of the Parent Institution, and from them the greatest benefit may be expected in aiding in the introduction of new cultures and the improvement of old ones into the district in which they are placed.

It is with this view that the Society have deemed it advisable to appropriate silver medals and pecuniary rewards to each of these Branch Institutions that the native gardeners and agriculturists may be stimulated to carry out the designs contemplated, by making an appeal to the strongest of their national characteristics, namely, their cupidity. Already most flattering accounts have reached the Society of the progress that has been made, and a lasting good must follow on a little further perseverance.

The Guinea Grass cultivation has been encouraged largely and the distribution of seeds and roots have been so extensive during the past year that there is every probability of every intelligent agriculturist availing himself of this very superior fodder.

It has hitherto been the boast of the Society that they seek to merit the continued support of the Government and the public by disbursing their funds as liberally as they are bestowed, and that they

Camilla, (Tipperah,)	1,600
Tirhoot,	500
Pubna,	600
Moorshedabad	600
Arracan,	600

have not been losers by so doing the present unprecedented state of the Society's circumstances is a sufficient proof. With the same feeling of dependance on patronage to come, an extension of prizes and rewards for the ensuing year have been made. The last report of the Society contains an abstract of premia and medals which were offered to encourage improvement in several articles of husbandry and commerce. These consisted of

<i>Date.</i>	<i>Names of Objects.</i>	<i>Amount Co.'s Rs.</i>
1837.		
April.	For the best work on Indian Agriculture in all its branches,	2,000
	For ditto, on the Agriculture of Bengal, . .	1,000
	For ditto, on the Agriculture of the Western Provinces,	1,000
		4,000
	To close in 1840.	
April.	For the best samples of Sugar, Silk, Cotton, and Tobacco,—Four Gold Medals,—at an assumed value of 120 Rs. each medal, . .	480
	For the second best ditto, of the above articles,—Four Silver Medals,—at an assumed value of 18 Rs. each medal, . . .	72
		552
July.	For imported Bulls, 1st, 2nd and 3rd best, . .	1,200
	For ditto, Rams, ditto,	450
	For the <i>best</i> Bull and Ram, a Gold Medal each, in addition,	240
	For the 2nd <i>best</i> Bull and Ram, a Silver ditto each,	36
	For the <i>best produce</i> of imported Bulls, half the above amount,	600
	For the <i>best produce</i> of imported Rams, do. Gold and Silver Medals, as above,	225
		240
	For the best bred Cow, imported from any part of the world,	250
	and the Silver Medal,	18
	For the best woolled Merino, or Saxony Ewe, and the Silver Medal,	100
		18
		3,377

1837.	For a cultivation of 20 beegahs of the best		
July.	Guinea Grass,	200	
	and the Gold Medal,	120	
	For a ditto, of 10 ditto, of ditto ditto, . . .	100	
	and a Silver Medal,	18	
	For a ditto, of 5 ditto, of the best Lucerne, . .	100	
	and the Silver Medal,	18	
	For a ditto, of 2 ditto, of the best Clover, . .	100	
	and the Silver Medal,	18	
	For a maund of Seed from the Guinea Grass		
	cultivation of 20 beegahs,	100	
	For $\frac{1}{2}$ a maund of ditto, from do. of 10 do.	50	
		—	824
August.	For 100 Otaheite Canes, imported from the		
	Mauritius, or other places beyond the Con-		
	tinent of India,	1,000	
	For the <i>first</i> importer of 200 Canes, the		
	<i>Gold</i> Medal, (in addition to a rupee per		
	Cane,)	120	
	For the <i>second</i> importer of the same num-		
	ber,—the <i>Silver</i> Medal, (ditto,)	18	
	For any individual who can exhibit a plan-		
	tation of 50 beegahs of Otaheite Cane,		
	on, or before the 1st January, 1839, . . .	2,000	
	and the <i>Gold</i> Medal,	120	
		—	3,258
November.	For a maund of the best Caoutchouc, the		
	produce of Assam, manufactured accord-		
	ing to the South American mode, . . .	100	
	For 10 seers of ditto, the produce of ditto		
	prepared over an earthen vessel, . . .	50	
	For the best specimens of Caoutchouc, the		
	produce of any other part of India, in		
	similar quantities, and prepared in the		
	same manner,		
	Premia of 100 Rs. and 50 Rs.,	150	
		—	300

Total Co.'s Rupees, 12,311

and in accordance with different resolutions the following prizes have been distributed.

GUINEA GRASS.

For a cultivation of ten beegahs of Guinea Grass by the late Mr. John Bell, the sum of 100 rupees, and Silver Medal.

For a maund of Seed from the above, 100 rupees. *Total 200 rupees and Medal.*

CAOUTCHOUC.

To Lieut. Vetch, for his exertions in making experiments, on and bringing to greater notice, the Caoutchouc of Assam. *Society's Gold Medal.*

To Mr. Rose for the best sample of silk out of four parcels submitted for the prize. *Gold Medal.*

To Mr. George Lay for the second best ditto. *Silver Medal.*

The former consisted of one seer (2 lbs.) of white silk, and 2 lbs. of yellow silk, the latter exceeding in weight the above by 1 lb.

To Signor Mutti, for his exertions amidst many difficulties in rearing the standard mulberry tree in the Deccan. *Gold Medal.*

COCHINEAL.

To Capt. Caillol, for having succeeded in bringing from the isle of Bourbon in a living state a quantity of the fine grained Cochineal insect. *Gold Medal.*

To Mons. Richard, superintendant of the Botanic Garden at Bourbon, for the promptness with which he has met the wishes of the Society on the important occasion of introducing the true Cochineal insect into Bengal. *Gold Medal.*

To Capt. Quirouard; Commander of the Alcide, for having been the first successful importer of the true Grana Fina from Bourbon. *Gold Medal.*

To Mr. H. Barchard, for having brought from England by the Ship Duke of Bedford, in November, 1838, the Cochineal insect in a living state. *Silver Medal.*

The following embrace the classification and extent of the Society's offers remaining for public competition.

PREMIUMS FOR WORKS ON AGRICULTURE AND HORTICULTURE.

It having been resolved upon, at a Meeting held on the 12th April, 1837, that Premiums should be offered for the best works on Indian

Agriculture and Horticulture, the following Resolutions, passed on that occasion, are advertized for general information.

1st.—For the best work on Indian Agriculture in all its branches, founded on experience in the country, to be presented to the Society on or before the 1st May, 1840, the sum of

TWO THOUSAND RUPEES.

2nd.—For the best work on the Agriculture of Bengal, to be presented to the Society on or before the 1st May, 1840,

ONE THOUSAND RUPEES.

3rd.—For the best work on the Horticulture of the Western Provinces, to be presented to the Society on or before the 1st May, 1840,

ONE THOUSAND RUPEES.

CONDITIONS.

1st.—The Society reserves to itself the right of refusing to grant any of the above Premiums, if the works on the above subjects, are not such as it approves.

2nd.—The Authors who may receive any of the above Premiums shall, within six months after the receipt thereof, publish the treatises to which such Premiums shall have been awarded, or the Society shall have the option of publishing, in case the Authors shall neglect to do so within the time above prescribed.

It having been resolved upon, at a Meeting held on the 14th November current, to renew the offer of Gold and Silver Medals to the producers of the best Staple Products of the Bengal Presidency, the Society is desirous of making known the conditions under which the distribution of these Medals is to take place.

SUGAR.

1st.—For the best Sample of <i>unrefined</i> Sugar,	
not less than 2 maunds,	<i>The Gold Medal.</i>
For the second best Sample of <i>unrefined</i> Sugar	
as above,	<i>The Silver Medal.</i>

SILK.

2nd.—For the best Sample of Silk, not less than	
2 seers,	<i>The Gold Medal.</i>
For the second best Sample of Silk, as above, . . .	<i>The Silver Medal.</i>

COTTON.

3rd.—For the best Sample of Cotton, raised from foreign seed, not less than 2 maunds, *The Gold Medal.*

For the second best Sample of Cotton, raised from foreign seed, as above, *The Silver Medal.*

TOBACCO.

4th.—For the best Sample of Tobacco, reared from foreign seed, not less than one maund, *The Gold Medal.*

For the second best Sample of Tobacco, reared from foreign seed, as above, *The Silver Medal.*

CONDITIONS.

1st.—The articles exhibited by Candidates for Medals, must be the produce of the Bengal Presidency, including Agra.

2nd.—The competition will be open to all persons whatever, without distinction.

3rd.—The articles must not be garbled but bonâ fide the average produce of the land on which they are grown, or of the manufacture.

4th.—All candidates for Medals must deliver along with their specimens, statements of the places where the articles were produced, the quality or nature of the soil and of the mode of cultivation and manufacture, and the cost of production.

5th.—A moiety of the specimens which shall be declared entitled to the *Gold Medals*, shall be the property of the Society, the remainder will be returned to the candidates.

6th.—Candidates are requested to affix to their specimens, a number or mark, and to accompany them with a sealed letter, and to mark the letter addressed to the Secretary with the words "Competition Letter," which letter will not be opened till after adjudication.

7th.—When two or more Samples shall be considered to be of equal quality, the Medal will be awarded to the Sample which may appear to have been raised at the least cost, and with reference also to the greatest quantity produced upon a given area.

8th.—All candidates are expected to have their specimens in the possession of the Secretary of the Society on or before the 1st May, 1839.

It was also resolved upon that the same premiums will be awarded and, upon the same conditions, for the year from May, 1839, to May, 1840.

N. WALLICH, M. D. } *V. Ps. and*
C. K. ROBISON, } *Acting Secretaries.*

Agricultural Society's Office, Town Hall, Calcutta, Nov. 20, 1838.

PREMIA AND MEDALS FOR THE IMPROVEMENT OF THE BREED OF CATTLE
IN INDIA AND ALSO FOR THE BEST PRODUCE.

For Cattle imported between the 1st January to 31st December, 1838, the Show to be held on the 1st February, 1839.

1st.—For the best imported Bull not less than 2 years old, premium of 500 rupees and the Gold Medal.

For the second best ditto ditto, a premium of 400 rupees and the Silver Medal.

For the third best ditto ditto, a premium of 300 rupees.

2nd.—For the best woolled Ram not less than 2 years old, a premium of 200 rupees and the Gold Medal.

For the second best ditto ditto, a premium of 150 rupees and the Silver Medal.

For the third best ditto ditto, a premium of 110 rupees.

3rd.—For the best bred Cow imported from *any part of the world*, a premium of 250 rupees and the Silver Medal.

For the best woolled Merino or Saxony Ewe, a premium of 100 rupees and the Silver Medal.

4th.—For the best produce of imported cattle half the above mentioned premia and the Gold and Silver Medals will be given on the 1st February, 1840.

GENERAL REGULATIONS.

1st.—The certificates of Stock to be shown must be lodged with the Secretary at the Society's Rooms on or before the 31st Inst.

2nd.—The competition is open to Stock from any part of the United Kingdom, New South Wales and the Cape.

3rd.—The name and address of the Exhibitor, the name of the breed and their age, must be regularly certified, and the certificate signed by the Exhibitor, agreeably to the form annexed which must be duly lodged on the above day.

The pedigree of the Stock so far as known, must also be given. A list of the Stock entered will be made up by the Secretary on the 31st, and no Stock will be allowed to compete that is not included in that list.

4th.—A responsible person on the part of the Exhibitor must attend at the Secretary's Office *on or before* the day *preceding* the Show at 4 o'clock in the afternoon, to give explanation if it should be necessary, to receive orders of admission for the Stock of which they are in charge and all necessary instructions in matters of detail at the competition.

5th.—In estimating the ages above prescribed, the following rules are to be observed, viz. the age of cattle will be calculated from the 1st of January of the year in which they were calved; and of sheep from the 1st March of the year in which they were lambled.

6th.—A ticket or order will be delivered by the Secretary on or before the day preceding the Show to the person in charge of each lot for its being received into the Show ground.

7th.—The competing Stock will be classed and distinguished by *tickets* or *numbers* to be affixed to each lot, immediately after they are placed in the Show ground corresponding with the list made up by the Secretary. By this arrangement the owner's name is not known to the judges.

8th.—The Committee of the Society appointed to conduct the arrangements for the Show, will appoint skilful persons to act as judges.

9th.—A member of the Committee will be appointed to attend the judges, and as soon as it is determined which animal or animals are entitled to prizes, the prize ticket shall be affixed to the animal. When the inspection is finished the judges shall sign and give in their Reports to the Committee, and their award shall be final, provided no valid objection is stated against the prize animal's right to compete; objections must be stated in writing; the ground allotted for the Exhibition is immediately in front of the Town Hall.

By order of the Committee,

HENRY H. SPRY, M. D., *Secretary.*

In addition to the foregoing the Society have placed at the disposal of Dr. Campbell, at Nepal, the sum of two hundred rupees (£20) and Lieut. Kirke, at Deyrah, two hundred rupees for the purpose of purchasing seed and making experiments for the Society.

For the purchase of cotton seed from parts of the world other than North America, for which a sum has been before voted *one thousand rupees.*

For the importation of Fruit trees from different parts of the world the sum of *five hundred rupees.*

To each of the Branch Societies *two Silver Medals* and fifty rupees.

To every individual who should bring to India till the end of 1839 the true Cochineal insect, the *Silver Medal.*

To encourage the culture of superior varieties of *Fruit* in and about Calcutta, Medals and money presents have been passed as the exhibition may warrant.

The Society has further undertaken to keep up a small plantation, in which to grow fruit trees of different kinds, and the Nursery Committee are now prepared to distribute plants to members for their own use. The Society takes this opportunity of returning its best thanks to those gentlemen who have so considerably contributed to the establishment of the nursery, by sending grafts and cuttings.

In the literary department activity has prevailed. The *Fifth Volume* of Transactions was published in the early part of the year. The *sixth* is now in a great state of forwardness and will soon be out. The former of these two volumes was alluded to in the Report of last year and requires therefore no other remark in this place. With regard to the latter it is only proper to mention that many of the papers that will appear in it will be found of great intrinsic value, both for the number of statistical facts embodied in them, and the practical information touching the cultivation of the chief staples of the country and the soil for their propagation. The volume will contain papers on the climate and capabilities of the Tenasserim Provinces on the sugar-cane cultivation,—on the nature and collection of the Caoutchouc or India rubber gum—on the diseases of grain—the Cochineal insect—silk-cotton, and other cultures, besides valuable practical Reports from the different standing Committees of the Society.

The great demand for the back volumes of the Society's Transactions led to the necessity, last June, of ordering a reprint to be made of the first, second and third volumes. The first of these has been effected and the second is almost finished.

In addition to the regular Transactions, the Proceedings of each monthly meeting are now printed as soon after the occurrence of each discussion as possible, for the purpose of furnishing distant members with an account of the doings of the Society, and also to put in the hands of congenial Institutions the nature of the information brought forward for consideration.

In conclusion the Society cannot close this Report without expressing an earnest hope that the account they have here rendered of their conduct during the past year may be considered deserving of the approbation of the members at large, and that the promising prospects now given forth to the public will be testified by their allegiance in joining the ranks of the Society and adding strength to an institution commensurate with its deserts.

Proposed by the President and carried, that this Report be adopted and printed.

HENRY H. SPRY, M. D. *Secretary.*

The balance sheet of the Society's Finances, embrace the following particulars :

Statement of Receipts and Disbursements, from 1st January to 31st December, 1838.

RECEIPTS.

From Members, current and consolidated Subscriptions, collected from 1st January to 31st December, 1838,	10,958	0	1	
„ Government, Annual Donation,	1,045	0	0	
„ Ditto, Monthly allowance for 12 months, at 135 13 6 per month,	1,630	2	0	
				<hr/>
				13,633 2 1
„ Proceeds of surplus Cape Seeds sold,	236	0	0	
„ Ditto of Copies of Society's Transactions,	271	0	0	
„ Ditto of Sugar-cane (blown down by the storm of 18th Oct.) produced in the Society's Nursery,	620	0	0	
				<hr/>
				1,127 0 0
„ The Government Saving's Bank, Interest on Company's Paper,				400 0 0
Total Receipts,				15,160 2 1

DISBURSEMENTS.

SEEDS.

By Messrs. Allan, Paton and Co., amounts of Mr. Villet's Bill, for Cape Garden and Flower Seeds,	1,390	0	0	
„ Charles Huffnagle, Esq., amount of Mr. Landreth's Bill for American Vegetable Seeds,	301	1	9	
				<hr/>
				1,691 1 9

FREIGHT.

By Messrs. Carr, Tagore and Co., for 6 cases of Cape Seed, ..	60	0	0
„ Messrs. Adam, Scott and Co., for 7 bags of Cotton Seed, ..	14	0	0
„ Messrs. Allan, Paton and Co., for 4 Ploughs,	13	4	3
„ Amount freight on Sundry Parcels, received during the year, ..	17	6	3
	<hr/>		
	104	10	6

SOCIETY'S NURSERY.

„ Dr. Wallich,—Mallees wages, Co- oly hire and sundry expenses, incurred for cultivating the Society's Nursery, from 1st December, 1837, to 30th No- vember, 1838,	1,762	13	9
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MEDALS AND PECUNIARY REWARDS.

„ Five Gold Medals supplied by the Mint,	652	2	0
„ Messrs. Pittar and Co., for 12 <i>orinary</i> Silver Medals, and 2 Morocco cases,	161	12	3
„ Gourmohun Roy, for engraving 2 Silver Medals and making 3 cases,	23	0	0
„ Mr. John Bell, Premium awarded by Resolution passed at a General Meeting, on 12th July, 1837, for a cultivation of Guinea Grass, &c., ..	200	0	0
„ Prizes to Mallees, awarded at the Exhibition of Vegetables, held, on the 29th January, 1838, ..	227	4	0
	<hr/>		
	1,264	2	3

ADVERTISEMENTS.

By Advertising in the Public Prints,
from 1st November 1837, to
31st October 1838, Notices
of Meeting, distribution of

Seed, Sugar-cane, &c., Offers of Premia for certain objects, &c. &c. &c.,	862 2 0
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ESTABLISHMENT.

By Secretary's Salary to 15th Novem- ber, 1838, Assistant Secre- tary's Salary from 1st Dec. 1837, to 30th Nov. 1838, Sirkars, Peons and Packer- man's Wages, from Dec. 1837 to Nov. 1838, both months inclusive,	5,676 6 9
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LIBRARY.

„ Books for the Society's Library,	118 12 0
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SOCIETY'S TRANSACTIONS, CIRCULARS, &c.

By Serampore Press, for printing and binding Vol. 5, of the So- ciety's Trans. 500 copies, ..	1,209 12 0
„ Ditto, for printing Proceedings of the Society for January and February, and for extra copies of Annual Report for 1837, .	135 2 6
„ Baptist Mission Press, for printing Proceedings of the Society for March, April, May, June and July, and New Rules of the Society,	155 0 0
„ Mr. T. Black, for lithographing Maps, &c.	332 0 0
„ Mr. Woollaston, for printing copies of Pamphlet No. 1, on Cochi- neal,	116 0 0
„ Church Mission Press, for binding up 18 copies of Vol. 3, Trans- actions,	9 0 0
„ Cossihur Banorjee, for printing Meeting Notices, Receipts for Quarterly Subscriptions, &c. &c.	66 0 0
„ Sundry Circulars, &c. printed, ..	24 0 0

 2,046 14 6

EXPERIMENTAL GARDEN AT NEPAUL.

By Messrs. Presgrave and Co., on account of Dr. A. Campbell of Nepaul, the yearly amount awarded by the Society for the cultivation of an Experi- mental Garden at Nepaul,	200	0	0
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COCHINEAL PLANTATION.

„ Mallces' wages for attending on the Society's Cochineal Plan- tation,	60	8	0
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SUNDRIES.

„ Messrs. Allan, Paton and Co., for 4 Ploughs,	50	0	0	
„ Postage and Banghy hire, on letters sent and received, ..	314	8	0	
„ Stationery, Blank Books, &c., for the Secretary's and Collec- tor's Departments,	196	12	6	
„ Petty charges, viz. Wax Cloth, String, Tin Boxes, Cooly and Dinghy hire, &c. &c. ..	139	2	9	
				<hr/>
		700	7	8

GOVERNMENT SECURITIES.

„ A Government Promissory Note of the 4 per cent. loan, for 500 Rupees less accruings of interest thereon,	483	8	10
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Total Expenditure, Rs.	14,971	7	7
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Dr.	MEMORANDUM.		Cr.
	RECEIPTS.		
By amount of Receipts from 1st January to the 31st December, as per Statement,	15,160	2 1	
By Balance in hand on 31st December 1837,	959	6 11	
	16,119	9 0	
	DISBURSEMENTS.		
To amount of Disbursements from 1st January to the 31st December, as per Statement,			14,971 7 7
To difference of Balance on 31st Dec. 1837, between Cash Book and printed Statement, supposed to have been disbursed in petty charges,			20 11 4
To Balance in the hands of Mr. Bell's Executors,			503 1 7
To Balance in the Bank of Bengal on 31st December 1838,			622 6 0
To Balance in the hands of the Acting Secretaries,			1 14 6
			16,119 9 0
	DEPENDENCIES.		
Amount invested in Government Securities, lodged in the Government Agency Office,			20,400 0 0
Interest in the Saving's Bank on the above, less 400 Rupees drawn out on 31st July 1838, and transferred to the Bank of Bengal,			416 11 3
			20,816 11 3

DONATIONS

30

THE AGRICULTURAL AND HORTICULTURAL SOCIETY OF INDIA.

From 1st January to 31st December 1838.

LIBRARY.

Agricultural Society of Bombay.

Two copies of Signor Mutti's "Guide to Silk Culture in the Decan."

American Philosophical Society.

Their Transactions, part 2, vol. 4, (4to.)

John Bell, Esq.

"A Comparative View of the External Commerce of Bengal" for 1836-37, 1837-38. By John Bell.

Coal Committee.

A copy of their Report "On the Coal and Mineral Resources of India."

W. Cracroft, Esq.

Thirteen volumes of Loudon's Gardener's Magazine, from the year 1826 to 1837, both inclusive.

Government of India.

Three copies of Dr. Helfer's Pamphlet "On the Natural Resources of the Tenasserim Provinces."

Two copies of Reports "On the Culture and Manufacture of Cotton-
Wool, Raw Silk, and Indigo, in India."

Horticultural Society of Cornwall.

Their Transactions, vol. 1.

Captain Jenkins, Governor General's Agent, N. E. Frontier, and Comr. of Assam.

A copy of the 5th Report of the Horticultural Society of Cornwall, and a copy of the proceedings of the Annual Meeting in 1837 of the Royal Institution of Cornwall.

Medico-Botanical Society.

'A copy of the Address of the President of the Society.

Madras Literary Society.

Their Journal, Nos. 14 to 20, both inclusive.

Signor G. Mutti, Supt. of Govt. Silk Culture in the Deccan.

"A Guide to Silk Culture in the Deccan." By Signor G. Mutti.

Royal Asiatic Society.

Their Journal, Nos. 7 and 8.

A copy of the Proceedings of their Committee of Agriculture and Commerce, for August 1837.

Don Ramon de la Sagra, Superintendent of the Botanical Garden at the Havannahs.

The Prospectus of a Work about to be written by him, to be entitled, "The Physical, Political and Natural History of the Isle of Cuba."

Baboo Rajnarain Day.

An "Essay on the Agriculture of Bengal." By Baboo Rajnarain Day.

H. H. Spry, Esq. M. D.

"Modern India, with illustrations of the Resources and Capabilities of Hindústan." By Henry H. Spry, M. D. 2 vols. (8vo.)

Society of Natural History of the Island of Mauritius.

Their Eighth Annual Report.

Tea Committee.

Forty copies of Mr. Bruce's "Account of the Manufacture of the Black Tea, as at present practised at Suddya."

Dr. Robert Wight, Madras Medical Establishment.

A copy of Instructions for the Cultivation of the Mauritius Sugar Cane, and Notes on Dye Lichens.

A copy of a Gardener's Calendar.

Dr. N. Wallich.

The Horticultural Register, No. 9, of vol. 3.—and nine copies of sundry papers.

A copy of Signor Mutti's pamphlet on Silk Culture in the Deccan.

MUSEUM.

Branch Agricultural Society of Moorshedabad.

Samples of Upland Georgia Cotton and Sandoway Tobacco, grown in their garden.

Branch Agricultural Society of Cuttack.

Samples of Upland Georgia Cotton and Virginia Tobacco, the produce of their garden.

Branch Agricultural Society of Beerbhoom.

Samples of Upland Georgia, Sea Island and New Orleans Cotton, the produce of their garden.

Branch Agricultural Society of Burdwan.

A packet of seeds, samples of Madras, Virginia, and Sandoway Tobacco; samples of Arrowroot and Guinea Grass, the produce of their garden.

Major Archer.

A quantity of Creole seed Paddy.

A large supply of a description of Mauritius Bean, termed "Pois Noire."

J. Balestier, Esq. American Consul at Singapore.

Specimens of two varieties of Singapore Cane, and a sample of Sugar.

John Bell, Esq.

A quantity of fresh Guinea Grass seed.

Lieut. H. L. Bigge, Junior Asst. to the Comr. of Assam.

A sample of Cotton grown at Gowhatti, Assam, from Peruambuco seed.

Captain A. Bogle, Commissioner of Arracan.

Three bottles of Sandoway Tobacco seed, samples of Arracan Rice and Sugar Cane.

Four specimens of Caoutchouc, a specimen of Salt, and a specimen of Cotton from Arracan.

Captain C. J. F. Burnett, Adj. Mhairwarrah Local Battalion.

Samples of Maize from American seed, and sample of Nankin and other Cotton, the produce of Captain Dixon's garden at Beawr, Mhairwarrah.

Captain P. T. Cautley, Superintendent of the Dooab Canal.

A quantity of Baunsmuttee seed Paddy.

Dr. A. Campbell, Assistant to the Resident at Katmandhoo.

A small quantity of "Ooah" or the Beardless Barley of Thibet.

Three varieties of Nepal paper, 100 sheets of each.

A box containing a variety of the Agricultural Productions of the valley of Nepal.

T. O. Crane, Esq.

A small sample of Cotton and a few of the seeds of a Cotton plant resembling the Sea Island Cotton seed.

R. W. Chew, Esq.

A bunch of Juneree.

A bundle of the Penang Gudung or large Plantain of the Straits.

Captain A. Charlton (74th Regt. N. I.)

Some Cochineal insects of the Sylvestre species, from the Cape of Good Hope.

H. Cope, Esq.

Samples of Egyptian and Nankeen Cotton grown at Meerut.

A sample of Wool.

W. C. Crane, Esq.

A bag of Bourbon Cotton seed.

Colonel Wm. Dunlop, Quarter Master General of the Army.

A parcel containing a variety of seeds of Hill Forest Trees, &c.

O. J. Elias, Esq.

A sample of Arrow Root.

W. K. Ewart, Esq.

A small quantity of seed of the Standard Mulberry Tree.

W. F. Fergusson, Esq.

A small bag of Egyptian Indigo seed.

W. F. Gibbon, Esq.

Two samples of Wool, viz.

One from an Imported Ram.

One from a Lamb of five Months.

A sample of Patna Wool.

C. B. Greenlaw, Esq. Secretary to the Marine Board.

Sample of Hemp from the "Seniiviera Zeylanica."

Major E. Gwatkin, Superintendent of the Hauper Stud.

Samples of Oats.

A. Harris, Esq.

A sample of Cotton grown in the Soonderbuns from Sea Island seed.
Samples of Sugar Cane grown in the Soonderbuns.

T. Henley, Esq.

A sample of Sugar Cane from Point de Galle, Ceylon.

R. S. Homfray, Esq.

Two samples of Paddy.

An Apricot, grown in his garden at Barripor.

B. H. Hodgson, Esq. Resident at Katmandhoo.

Some red and white Clover seed.

Some Ooah or Bhote Barley.

H. C. Hulse, Esq. (Veterinary Surgeon) 10th Light Cavalry.

A Plan of a Horse Breeding Establishment.

Four samples of Merino Wool, and samples of Grass and Grass Atta.

W. C. Hurry, Esq.

An ear of Pennsylvania Corn.

Dr. Huffnagle.

Specimens of Indian Corn from American seed.

A bale of Cotton from Upland Georgia seed, and two bottles of Oil expressed from this seed.

Dr. A. R. Jackson.

A quantity of Corn seed.

Captain Jenkins, Governor General's Agent, N. E. Frontier, and Commissioner of Assam.

A sample of Moongah raw Silk.

Samples of Rheea Hemp and Indian corn.

A sample of Mishmere Wool.

A sample of Rosin, and of the "Nagee Cassier Bark."

A sample of Indigo.

From Assam.

Rajah Kalikishen.

A Sugar Cane called "Porce Ook."

Lieut. Henry Kirke, Adjt. Sirmoor Battalion, Deyran.

Two boxes of Flower seeds.

George Leyburn, Esq.

A quantity of seed Barley, a few sample pods of Egyptian Cotton, grown at Shahabad.

Thomas Leach, Esq.

Some Strawberry seed.

R. Lowther, Esq. Commissioner, Allahabad,

Two bottles of Mangul Wurzel seed.

Samples of New Orleans and Upland Georgia Cotton, grown at Allahabad.

C. Manly, Esq.

A small quantity of Nankeen Cotton seed.

Captain H. Macfarquhar, Senior Assistant.*

Sample of Caoutchouc, Dammer Varnish, and Cotton, from Tavoy.

J. P. Marcus, Esq.

A quantity of Rhoosa Grass seed, sample of dried country Cochineal, and a maund of Baunsmuttee seed paddy.

J. H. Mackie, Esq.

A small quantity of country Wheat.

T. H. Maddock, Esq. Secretary to the Govt. of India.

A few Pear seeds.

D. F. McLeod, Esq. Principal Asst. to the Agent to the Govr. Genl. in the Saugor and Nerbuddah Territories.

Specimens of raw Tussur Silk, from Seonee.

Specimen of Tusser raw Silk, Eggs of the Worm, and a piece of cloth made from the Silk, at Burdwan.

Major J. A. Moore.

A few Potatoes of a very superior description, and some Apples of the nonpareil species, grown at Hydrabad.

Mr. McCullogh, (Head Gardener to the Pacha of Egypt.)

A quantity of Egyptian Cotton seed, and some Dutch Clover seed.

Rev. J. Parry.

Specimens of Sandoway and Madras Tobacco, and sample of the Soil in which they were grown at Jessore.

Jas. Pagan, Esq. C. Asst. Surg. Rungpore.

Sample of Cotton grown at the foot of the Rungpore Hills.

J. W. Payter, Esq.

A few pods of New Orleans Cotton.

Miss Peacock.

Pod of a large species of Tamarind, the produce of Mhow.

H. Piddington, Esq.

A quantity of American Maize, a sticking made from the Nankeen Cotton, and a small supply of Asparagus Bean.

* To the Commissioner of the Tenasserim Provinces.

James Pontet, Esq.

Specimens of Bhaugulpoor raw Tussur Silk.

G. Pratt, Esq.

Specimen of dried South American Cochineal.

Baboo Rajkissore Mookerjea.

Specimen of Cotton grown at Hazarcebaugh, from Sea Island seed.

Dr. J. F. Royle, Secretary, Committee of Agriculture and Commerce of the Royal Asiatic Society.

Some samples of American Maize.

Sir E. Ryan.

Sample of Mauritius Maize.

Dr. K. M. Scott, Gowhatti, Assam.

A sample of Tea from Gowhatti.

Colonel Skinner.

A sample of Upland Georgia Cotton.

R. Smith, Esq.

Several musters of "Caoutchouc Cloth."

G. H. Smith, Esq. Collector of Government Customs, N. W. Frontier.

Samples of Upland Georgia and Sea Island Cotton, grown at Delhi.

Lieut.-Colonel C. C. Smyth, (3rd Regt. Light Cavalry.)

A few seeds of Beech, Birch and Alder.

W. Storm, Esq.

A muster of Wool from imported English Sheep.

D. W. Speed, Esq.

A stock of Sugar Canes.

F. P. Strong, Esq.

A small quantity of English Rye Grass and Dutch Clover seed.

A log of the Buckum wood, and some seeds of the Buckum tree.

Colonel L. R. Stacy, (43rd Regiment, N. I.)

Some roots of the "Suth moolee" or the 60 Radishes, and a few pods of a Climber termed "Tuh Gulah."

Captain H. Vetch, Senior Assistant to the Agent to the Governor General and Commissioner in Assam.

A maund of Caoutchouc, collected at Assam.

Dr. N. Wallich.

Six Nutmegs from the Pallaraveran Plantation, Quilon.
Specimen of Soil, and Articles of Pottery Ware, from the soil.

Thomas Waghorn, Esq.

A chest of 2 maunds of Egyptian Cotton seed.

Lieut. James Wemyss, (44th N. I.) Adjutant, Assam Light Infantry.

A specimen of Assam Caoutchouc.

GARDEN.

J. Bulestier, Esq. American Consul at Singapore.

Two bundles of two kinds of Sugar Cane, from Singapore.

Captain Oswald Bell.

Several varieties of Fruit trees from the Straits, Singapore, &c.

T. O. Crane, Esq.

Five Sower-sop plants, and 1 Mam-mam, from Singapore.

Jeffrey Finch, Esq.

Fourteen Apple-tree grafts from Tirhoot.

Captain Hullock, Commander of the "Donna Carmelita."

Twelve casks and 9 half casks of Cane Tops, and a bundle of Sugar Cane, from the Mauritius.

J. G. Ivison, Esq.

A dozen Vine plants.

J. W. Laidlay, Esq.

Four grafts of superior Mango trees, from Moorshedabad.

Dr. W. Montgomerie, Senior Surgeon, Singapore.

Three bundles of Singapore Sugar Cane.

Mons. Richard, Supt. of the Botanical Garden, Isle of Bourbon.

Eighteen cases of Sugar Cane, and some Nopal plants, with the Grana Fina Cochineal Insect attached.

William Storm, Esq.

Nine Malda Mango grafts.

REGULATIONS

FOR THE

AGRICULTURAL AND HORTICULTURAL SOCIETY OF INDIA,

SANCTIONED AT A

GENERAL MEETING,

Held at the Town Hall, Calcutta, March 14, 1838.

ART. 1.—The promotion and improvement of the Agriculture and Horticulture of India, constitute the objects of the Society.

2.—Gentlemen of every nation shall be eligible as Members of the Society.

3.—Candidates for admission as Ordinary Members shall be proposed by two Members, at a General Meeting, and balloted for at the succeeding, when a majority of votes will determine the election.

4.—Honorary Members shall be persons eminent for their knowledge of, or encouragement given to Agriculture or Horticulture, or for services rendered to the Society. They are to be proposed and balloted for as Ordinary Members, but two-thirds of the votes are to determine their election. Ordinary Members who may peculiarly distinguish themselves in the advancement of the objects of the Society shall, on their finally quitting India, be eligible as Honorary Members, but must be balloted for as above.

5.—Ordinary Members are to pay an admission fee of 8 Rs. and the same sum quarterly, in advance, so long as they continue resident in India. It shall be optional for any Member to compound for the quarterly contributions by the payment of 400 Rs. to the funds of the Society.

6.—Members, whose absence from India beyond the Cape is merely temporary, shall continue to be borne on the list of Members, but shall be exempt from the payment of subscriptions, until their return to the country.

7.—Resident Members, allowing four quarterly bills to run into a fifth unpaid, the same having been duly demanded, shall cease to be Members of the Society and their names shall be erased from its list. Ex-members thus situated, shall not be eligible to re-election, except upon payment of all arrears; and it shall be the duty of the Secretary to bring this article to the notice of the party proposing such Ex-member, and prevent the name from being brought forward, until all arrears of subscription are discharged.

8.—The Anniversary Meeting shall be held in January when the election of Office-bearers shall take place, consisting of,

- 1 President.
- 2 Vice-Presidents, two of whom shall always be Natives.
- 2 Secretaries, one European, and the other Native.
- 1 Collector.

9.—A General Committee shall also be elected annually, consisting of the Office-bearers, and six Members. There shall besides be Select-standing Committees, for the more ready despatch of business as shall be arranged from time to time, at the General Monthly Meetings.

10.—General Meetings shall be held at the Society's apartment in the Town-Hall on the second Wednesday of every month throughout the year.

11.—Special Meetings may be convened at any time, on a requisition to that effect, signed by at least six Members.

12.—The Bank of Bengal shall be the Treasurers of the Society, and when the surplus in their hands may amount to 1,000 Rs. it shall be invested in Company's securities, on behalf of the Society, in the joint name or names of the Secretaries and Collector for the time being.

13.—Such communications made to the Society as may be deemed of public utility by the Committee of Papers, shall be published, whenever a sufficient number have been collected to form part at least of a volume.

14.—Notice of motion shall be given on all questions relating to Finance, at a General Meeting, preceding that on which the subject is to be disposed of, in order that Members who take an interest in the question, may have an opportunity of signifying their assent or objection either verbally or in writing; all such notices shall be

recorded in the Journals along with the Proceedings, and hung up, for inspection in the Society's apartments

15.—Motions, of which previous notice has been given, shall take precedence of all others.

16.—The same rule and precedence (See Nos. 14 and 15) shall be applicable to all motions involving points of importance, and no resolutions shall be confirmed at the time of being brought forward, unless the case be urgent.

17.—Members (non-resident) applying for seeds shall distinctly state to whose care such seeds are to be delivered in Calcutta. The Society cannot undertake to despatch them.

18.—Members shall be entitled to a share of all seeds or plants purchased by, or presented to the Society.

19.—Members shall be entitled to a copy of the Society's Transactions, published subsequently to their election. For all previously published volumes, they shall pay the cost charges. Art. 17 applies equally to the transmission of these volumes.

20.—Members of Branch Societies, and who are also Members of this Society, shall not be exempt from contributing to this Society, but they shall be entitled to a double share of all seeds distributable.

21.—Authors, whose papers may be published in the Transactions of the Society shall be entitled to 20 copies for their own private use; any more required, must be paid for at prime cost.

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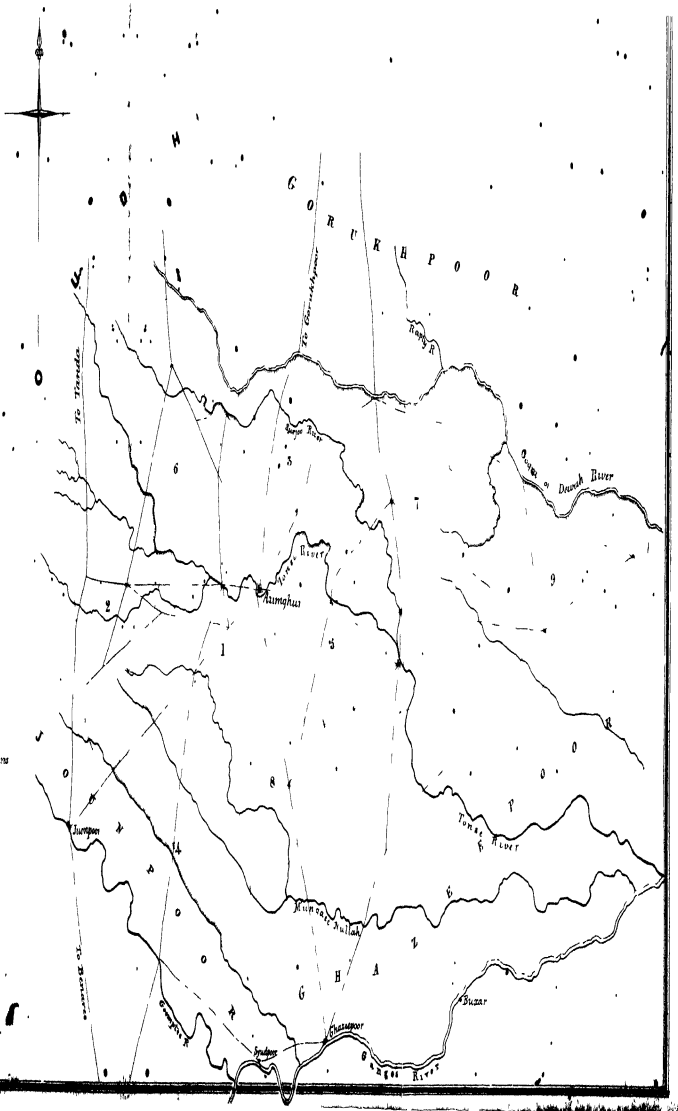


AZINGHUR

Names of Tahsil-dars.

1. Muzamabadi
2. Mahal
3. Sagar
4. Dargah
5. Mohammodabad Mhow
6. Atrolia Amlia Sopalpoor
7. Gore Vadipoor
8. Charanoli, Quasr and water Bilhadara
9. Soudripoor, B. Adara

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ERRATA.
TRANSACTIONS OF THE SOCIETY.

- Page 55, line 8, for "branches," read "bunches."**
,, ,, line 8, from the bottom, for "Mrs.," read "Mr."
,, 60, line 11, from the bottom, for "poles," read "holes."
,, 69, line 7, from the bottom, for "spars," read "spurs."

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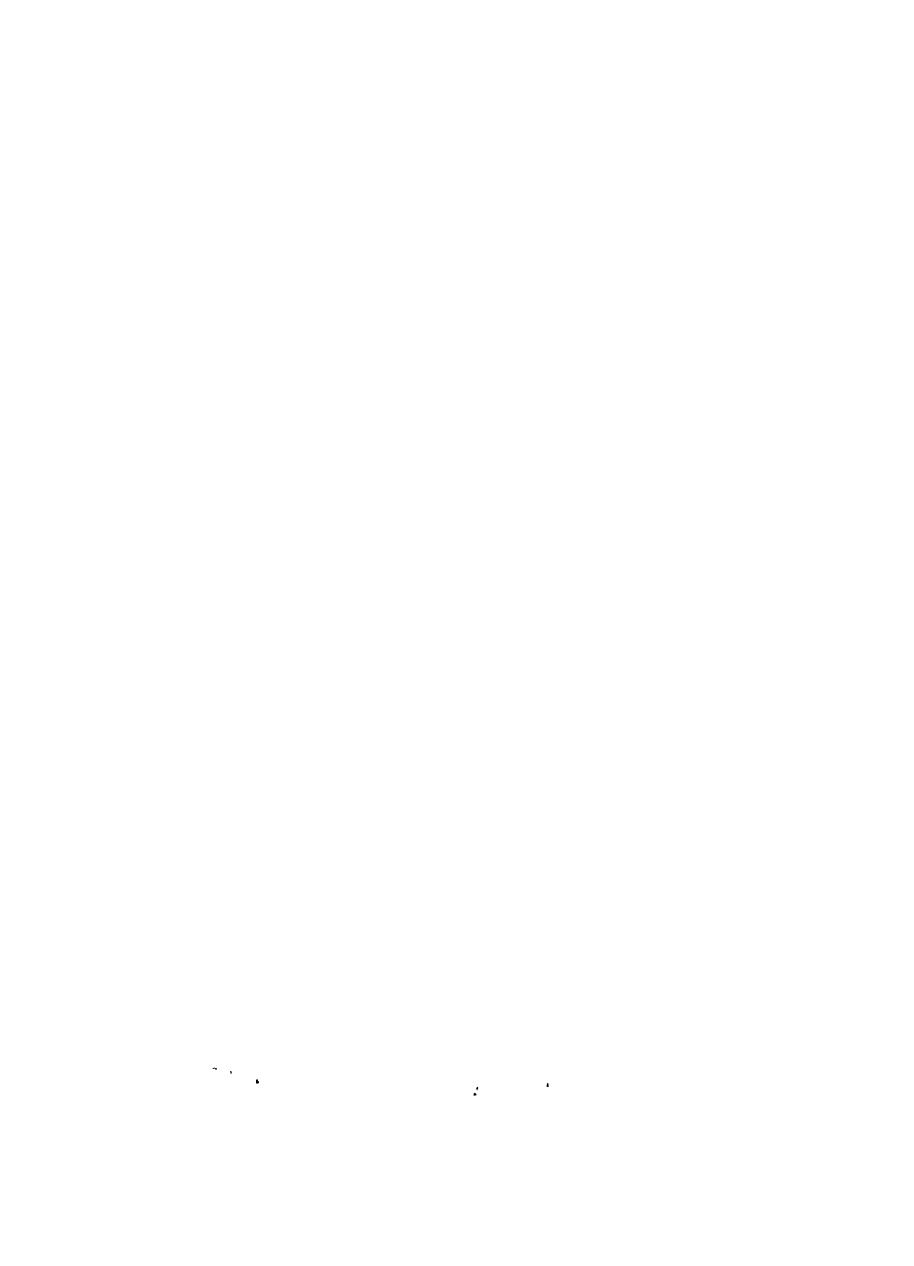
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