JOURNAL

OF THE

CEYLON BRANCH

OF THE

ROYAL ASIATIC SOCIETY,

1860-61.

VOLUME III.

Nc. 12.

EDITED BY THE HONORARY SECRETARY.

"THE DESIGN OF THE SOCIETY IS TO INSTITUTE AND PROMOTE ENQUIRIES INTO THE HISTORY, RELIGION, LITERATURE, ARTS, AND SOCIAL CONDITION OF THE PRESENT AND FORMER INHABITANTS OF THE ISLAND, WITH ITS GEOLOGY, MINEROLOGY, ITS CLIMATE AND METEOROLOGY, ITS BOTANY AND ZOOLOGY."

COLOMBO:
PRINTED AT THE "CEYLON OBSERVER" PRESS.
1894.

CONTENTS.

ROYAL ASIATIC SOCIETY,
CEYLON BRANCH.

HEALTH AND DISEASE IN CEYLON,

By Boyd Moss, Esq., F.R.C.S.

Opinions vary much concerning the healthiness of the climate of the Island of Ceylon, many considering that good health is quite incompatible with a prolonged residence here, and it is with a view to enquiry concerning the truth of this supposition, that I have written the few following pages, hoping that they may possibly be of some eventual service to my fellow-countrymen.

There have been, of late, many melancholy deaths among us,—friends taken away whom we have seen in apparently perfect health but a few days before; and it is a question of great moment and interest whether this fatality is an unavoidable result of a residence in this climate, or whether it can be proved that the increased mortality in this, over more temperate regions, is owing to some fault in our manner of life, or to our own carelessness and neglect of ordinary precautions in avoiding the causes of disease.

Now, I do not hesitate to express an opinion that we may, with ordinary care, pass many years in this Island, without more cause, or with very little more cause, for serious complaints, than in England. I believe that a decrease of bodily vigour, shewing itself in more or less disinclination to exertion, is the only unavoidable result of a residence here, and even this applies only to some parts of the Island, where we find

the atmosphere at the same time hot and loaded with moisture, a combination which is always especially relaxing to the constitution.

Of course sportsmen and others whose occupation leads them to unhealthy districts, must expect to be liable to fever; but any one sleeping in a tent night after night among the marshes of Essex, or the fens of Lincolnshire, would be equally so. Medical men do not meet with half the diseases in this Island which they are accustomed to see in England, and the most common complaints occurring here, viz., fever and dysentery, are generally so easily cured, when properly treated at their commencement, that I cannot but conclude, that to self-neglect is to be attributed a very large proportion of the deaths among our countrymen in Ceylon.

There is, however, another cause, and I fear a nearly equally great cause of mortality among the adult male portion of the community. I allude to the far greater indulgence in spirituous liquors which obtains here among young men, over what the same class are accustomed to in England. I am sure that any one, on recalling the deaths among male Europeans which have taken place within his memory, will at once admit the truth of this assertion, that drink has had, directly or indirectly, a large share in the mortality. The constitution becomes undermined by the constant indulgence in this habit, and is unable to resist the attack of what might otherwise have been a trifling complaint. I believe that the custom of taking spirits and water regularly twice a day, on board ship on the voyage out from home, is one great cause of this; and when we consider the solitary life often led by Planters on Coffee Estates, it is hardly to be wondered at that the habit thus acquired should be difficult to break through.

I believe that the mode of diet of Europeans in India generally, is very much against a continuance of good health: and here I feel that I am entering on a subject which must necessarily meet with some opposition; for there are few

tasks more difficult than that of convincing people that they are wrong in habits, which time and custom have led them to consider as necessary to their existence.

Now, there is no greater error than an idea, which is by no means an uncommon one, that we need a larger supply of animal food in hot climates, than in temperate ones. The reverse is the truth, and there is no better proof of this than in the fact, that we continually see people obliged to have recourse to bitters, before they can induce an appetite to enable them to consume their food, nature evidently resisting this overloading of the system with an unnecessary amount of nourishment. Why is it that we fancy hot curries, chutnee, and stimulants of a similar kind? Not, as I shall presently endeavour to shew, because they are the natural or necessary food of a hot country, but because we find again the stimulus of the chillies and spices necessary to enable us to get through the meal; the stomach becoming thereby incited to attempt to digest more food than is good for it. I really believe, that eating in India is very frequently, or I should say very generally, more a means of passing time than a necessity, and that in proportion as we are enabled to take a larger amount of bodily exercise, we shall find the taste for stimulants of the curry kind diminish. More occupation for the mind, and increased means of amusement, so often wanting in English societies in India, would probably conduce to the same effect.

Many will answer my arguments, by saying that Providence has suited the food of different countries to their inhabitants, and that we, as inhabitants of India, cannot err in following the manner of living, and the diet of the natives.

Now this results from an extremely superficial view of the matter, for, with few exceptions, the food of any nation depends, not on the climate, but on the state of civilization of that nation. Providence has provided suitable food for the lower animals, because they are not gifted with reasoning powers, but merely with instinct, that is, with a faculty

which is incapable of further development; therefore it was necessary that their instinct should guide them at once to the description of food which is exactly suited to their wants. But on man a mind has been bestowed, which he is expected to make use of in bettering his own condition and that of his fellow-creatures, and thus we see, that as a nation passes from a savage to a civilized state, that not only the arts and sciences, but the general manner of living and feeding, pass through progressive stages of development.

There is one exception perhaps to this law, in the case of the inhabitants of the Polar regions; but it is an exception that goes to prove the rule, for these countries, from the nature of their climate, may perhaps be said to be incapable of change or improvement, and their inhabitants are so far placed on a level with the lower animals, for the only food which they can obtain is such as is best suited to sustain life and bodily heat; and we find their taste, consequently, directed to such food as train oil and blubber, without which they would be unable to maintain a healthy existence in the intense cold of the Arctic regions.

Therefore I say, that the exception in the case of these people, helps to prove the general rule, that we must not be guided in our choice of food, in most countries, by the present diet of their inhabitants. The climate of the Polar regions is such that, in all probability, no great progress can ever be made in their state of civilization, and consequently, we see that Providence has given them an inclination to a description of food exactly suited to their wants.

Now, the climate and soil of all other countries, admit of more or less application of the progressive improvements in agricultural science, therefore, though in the uncivilized state of some nations, we may find them existing, in one case on raw or putrid fish, as on some parts of the West Coast of Africa: or, in another case, consuming for food their own species, as among cannibals; we are not, if our lot happens to be cast in these countries, to consider it best for our health to follow

the example of the natives, but we should follow the suggestions of our own more advanced state of civilization.

We now return to the question of the propriety of the ordinary diet of Europeans in India. We find among the natives a very general use of hot spices, chillies, and such stimulants; but what encouragement does their condition present to us, to imitate them? We see them, for the most part, a weak and indolent race, disinclined to the least extra exertion, and when attacked by disease, much sooner succumbing to it than Europeans. They are, occasionally, perhaps induced to exert themselves under the hope of a reward, but then, though a casual observer might think them capable of enduring a large amount of fatigue, they will generally be found to suffer from it afterwards.

These remarks of course apply principally to the working classes, who form, I imagine, at least nine-tenths of the population of India,—and these, it must be admitted, frequently suffer much from insufficient or bad food; but still their boiled rice, with even a very small quantity of vegetable or fish, contains fully as much nourishment as the potatoes on which the poorer class of Irish, in many cases, almost entirely subsist; and yet an Irishman will, I will venture to say, do three times the amount of work in a day, that can be got out of a cooly, or a Singhalese workman.

To this some, perhaps, will say, but what amount of work would the Irishman do on a Coffee Estate under a hot sun? My reply would be, put them both under similar conditions, that is, the Irishman under a hot sun in India, and set the cooly to work in Ireland in the winter, and I think it would then be found that the Irishman would still do three times as much work as the native of India.

Now, I think that the deduction from this must be, that there is something in the food of the natives here that interferes with the proper digestion and distribution of the actual amount of nourishment which they consume; and I can imagine nothing better calculated to effect this, than

a continual stimulation of the digestive organs by hot pepper, spices, &c., especially when we consider the constitutional change which is always effected by habits of any kind, continued from generation to generation.

With regard to the use of a meat diet by inhabitants of hot countries, we find that there is very often some provision in the laws of their religion, which tends to diminish the supply of animal food. Thus, among the Hindús the cow is sacred, among the Jews the pig is forbidden as food, and the Siṇhalese are not, or were not, permitted to eat beef. Now we find no such laws among the inhabitants of cold climates, and may, I think, reasonably conclude, that these ordinances, like some other religious ceremonies among Mohammedans, were originally instituted for the health of the people; who, otherwise, from the elementary state of knowledge at the earlier periods of the world, might have committed excesses, which in time would have produced the degeneration and eventual destruction of the race.

The medical science, however, of the present day, explains why one particular diet should be suited to a hot, and another to a cold country. Respiration serves two principal purposes in the human body, it purifies our blood by carrying off from it a substance called carbon, in the form of carbonic acid gas, and at the same time maintains, by a chemical process, the natural heat of the body. Now respiration is quicker in a cold climate or in cold weather than in a hot climate, that is, in a given time we perform a greater number of inspirations and expirations in cold weather than in hot. Now, although in a hot climate there is less work for the lungs in maintaining the temperature of the body, as that of the surrounding atmosphere is so great, still the purification of the blood requires to be carried on; and so, if we still introduce as much carbon into the system in the shape of food, we shall find that as the lungs do not act so frequently, the carbon must accumulate in the blood, or be got rid of by some other means; now this other means of disposing of it is through the liver, which thus has an extra amount

of work thrown on it, and disease is produced unless we adopt one of two courses. We must either increase the action of the lungs, which we may do by active exercise, or we must decrease the amount of food, especially those articles of food which contain most carbon, such as rich and fat meats and spirituous liquors. This fact is well-known by those who supply the unfortunate geese, whose livers make the celebrated *patés de foie gras*. They treat them exactly as many of us treat ourselves in India. They are confined in a hot atmosphere, allowed to take no exercise, and crammed with quantities of rich food. Many, no doubt, are aware of this, and never think of applying it to their own case. I have heard the same person at one moment expressing an opinion that we required here a large amount of animal food to keep up our strength, and, shortly after, dilating on the impropriety of feeding dogs on meat in a hot climate, as it would inevitably kill them.

I will now endeavour to point out by what means, in my opinion, we may best preserve our health in this country. The first thing, without doubt, is a sufficiency of bodily exercise, riding or walking—especially the latter; the best time for this being the early morning: it is within the power of all of us to obtain this. Cold bathing I need hardly mention, as it is a thing few or none of us neglect; but the time at which we should bathe is of some consequence, the best time being in the morning, immediately after the ride or walk,—always before a meal, never soon after: the fact of being warm from active exertions offers no objection to the use of the cold bath, that is, we may without danger go under a spout of cold water in a state of active perspiration from violent exercise. The only reason for avoiding sudden immersion in cold water, is, where we are exhausted from fatigue, and the temperature of the body is fast cooling down. Avoid as much as possible exposure to the sun, never going out in the heat of the day without an umbrella, or a board-brimmed pith hat. It is by no means uncommon to see Europeans in Ceylon, with nothing on their heads

but a Glengarry bonnet, or a small cloth cap, under a burning sun. The wearer, in these cases, can only expect what he deserves, a sun stroke or disease of the liver.

Endeavour as much as possible to avoid a stimulating diet, and heavy late meals, and observe moderation in, not abstinence from, wine, beer, and spirituous liquors. It is almost useless to say anything against late dinners, as the occupation of most people is such as to prevent any alteration in the time at which they take their meals. It is one of the evils inseparable from a state of high civilization, that health is continually sacrificed to temporary advantage; and the more successful that a man is in his business, the less successful he will probably be in the preservation of his health. The quality of our food, however, is nearly always under our control. We are seldom forced to eat what does not agree with us, and, I believe, that if we partook of animal food once only during the day, it would be the better for us; and we should avoid highly-spiced and rich fat dishes; in fact, nature as plainly as possible seconds this advice, for we find the animals of the country peculiarly destitute of fat, while the same animals in cold countries, are, when in a state of health, loaded with it. As far as they themselves are concerned, this is, of course, also a provision of nature dependent on temperature of climate.

Children here are sometimes most improperly fed; I have seen them literally crammed twice or three times a day with meat and curries, to say nothing of little interludes in the shape of biscuits, plantains, &c., the anxious parent all the while wondering why they look so pale, and of course throwing all the blame on the unfortunate climate. It never occurs to her for a moment that the children's digestive organs might possibly be the better for an occasional ten minutes rest; it is not to be wondered at that they have to be sent home after a year or two of this treatment. Children in this climate should most certainly

eat meat but once in the day, and curries I look upon as slow poison to them, unless they are made without most of the usual constituents of a curry.

I have already said that the diseases of most common occurrence in Ceylon, are, if properly attended to at their commencement, generally very easily cured; at the same time complaints which in England would be considered trifling, and might be often neglected without ultimate injury, will not bear the same neglect here, and may soon become serious and permanent. Therefore, we should always apply for medical aid at the first intimation of any departure from our ordinary state of health. Avoid quack medicines and popular remedies, such as "Cholera Drops," the virtues or rather vices of these latter, always depending on the presence of laudanum or opium in some form, which in my opinion is poison in genuine Cholera, and hardly ever necessary, but on the contrary hurtful, in ordinary bowel complaints among Europeans. Any remedy, too, containing opium, is especially objectionable in unprofessional hands, as a medicine for children. A child of nine months old has been killed by four drops of laudanum, and one of four and-a-half years by one-third of a grain of opium; in another case, a drop and-a-half of laudanum proved fatal to an infant, and yet I have seen printed directions in this country for the cure of Dysentery, recommending indefinite doses of "Dover's powder," which contains opium, without any such warning concerning children as that I have just given.

I have noticed a rather prevalent habit among our countrymen in the Island, of taking quinine whenever they fancy themselves to be what they call feverish. Now, although this may do no particular harm, yet it can hardly ever be productive of much good, and may interfere with the proper action of the medicine when it is really required. There is only one case, I think, where quinine is likely to be of service when taken without medical advice, and this is when we are obliged to pass a short time in a

part of the country particularly subject to fevers, and then three or four grains of quinine taken in coffee in the morning will, I believe, give us a very good chance of escaping an attack. This medicine, in skilful hands, is to fever as water is to fire, but when given at improper times, or in insufficient doses, it is generally worse than useless. Change of air is another remedy of great benefit to invalids, but is often much abused and misunderstood. A sea voyage is, unless peculiar circumstances forbid it, generally the best change from this climate; not to the coast of India, or any place still hotter than Ceylon; such a change can seldom be of any use. A trip by sailing vessel to Mauritius, Australia, or the Cape, will generally be the best; and the worst of all changes, unless the person is convalescent, and able to bear much fatigue, I consider to be the Overland Journey home. It is astonishing, after the numerous deaths that have occurred among invalids on this route, that any medical men should still be found to advise their patients to risk their lives by such a proceeding. The journey is most fatiguing to any one, and doubly so to an invalid. I can only conceive one circumstance which can justify the adoption of the Overland Journey by a person seriously ill, and that is when recovery is impossible, and the patient has a wish, at any risk, to die among his or her friends at home. Of course, there are instances where a permanent cure is best effected by the change to the climate of Europe, but the sick person should at any rate possess a sufficiency of strength and convalescence, to enable him to bear the excitement and fatigue of the journey; and if this cannot be brought about by proper medical attention here, I fear it must very frequently happen that the patient will not reach home alive. It is seldom, perhaps, that medical attendance is to be had on a voyage hence to Australia or round the Cape; but I really believe, that in nine cases out of ten, the patient in this case would have a better chance without a Doctor, than on the Overland Journey with a dozen.

A few words in conclusion, on the change of locality, to be obtained by invalids within the Island. To those living in the interior, a visit to Colombo will, in nearly all cases prove, except during the hottest months, a most salutary change. I believe, however, the advantage of Nuwara Eliya as a sanitary station to be rather overrated. I cannot speak from personal observation, but from the description of others, it is apparently excessively damp; and the great range of temperature during the twenty-four hours, from actual frost at night, to tropical heat during the day, leads me to think that there are many places, at a lower elevation, far more generally adapted as a residence for invalids. Of all parts of the Island which I have as yet visited, the Kelebokka Valley is certainly that to which I should be inclined to send any patient of mine, to whom a change from the low country was necessary. I have seen the thermometer there down to 49° in the early part of the year, a temperature sufficiently low for invalids who have probably been residing in an atmosphere, where the thermometer seldom stood below 70°.

Change for the mind is, however, often nearly as efficacious in producing a return to health, as change of locality; and it is for this reason that I am inclined to think highly of Mauritius, as we may there obtain those social amusements in which our Island is unfortunately so deficient, and which I feel sure form no unimportant element in the preservation of health in this climate, where, as I have before said, almost the sole amusements to which many can look forward after the labours of the day, are the pleasures of the table.

CINNAMON.

By James D'Alwis, Esq.

CONSIDERABLE doubt was, sometime ago, raised by Sir James Emerson Tennent,* as to the opinion generally entertained by Botanists and Historians,—that "the Cinnamon plant is indigenous to Ceylon." During the prosecution of his inquiries upon the matter, my attention was invited to the subject; and the result of my investigations is embodied in the following extracts of a letter which I addressed to him, and which, from the peculiar interest which attaches to the question in a historical point of view, I beg to lay before this Society.

If Cinnamon (*Laurus Cinnamonun*, Lin. *Cinnamomum Zeylanicum*, Nees.) were introduced into Ceylon from the neighbouring Continents of Asia and Africa, it is but reasonable to expect that it is still to be found in them. It is not a little curious, however, that no Cinnamon grows in the latter—at least in the vicinity of *Abyssinia*, which is described by travellers as possessing a soil anything but favorable to the growth of Cinnamon.† It is also, I believe, a fact, that during the Dutch Government in Ceylon, Java was not considered to produce either Cinnamon‡ or Cassia, though, doubtless, the latter was found in a wild state:

* He has embodied the result of his researches in his "History of Ceylon," vol. I. p. 599, *et seq.*

† Speaking of "the Eastern Coast of Africa to the unknown regions," Laurent, in his *Ancient Geography*, describes it as "those parched lands over which Arabs roved in former days as in the present."—p. 348.

‡ In the year 1827, twenty-five boxes of Cinnamon plants, besides a considerable quantity of seeds, were introduced into Batavia, *smuggled from Ceylon*, by an agent in the service of the Dutch Government.—See *Asiatic Journal*, 1827, vol. xvi. pp. 282-3.

and it is generally believed that all the Cassia which is exported from Malabar, Java, and even China, is the produce of trees cultivated in those countries within the last half-century. Buchanan, in his "Account of Mysore," (vol. II. p. 512, &c.,) thinks the spice grown in the Continent to be "without doubt the *Laurus Cassia* of Linnæus."* Even under the Portuguese Government, we learn from Ribeiro (Lee's Translation, p. 141,) attempts were made to improve the quality of the spice grown at Quilon, and in the forests of Porca; but none could be made to compete with that of Ceylon in taste or in fragrance: and you will find that Lee also quotes from Lord Bacon, to shew that half a century earlier than Ribeiro, Cassia was used as a substitute for Cinnamon.†

It is not a little remarkable that Colebrooke in his *Amara kósha*, and Professor H. H. Wilson in his Sanskrit Dictionary, give "woody Cassia" as the signification of the Sanskrit terms "*twak-pattra, mutkatan, brungan, twachan, chóchan, varáṅgakan*;" which are synonymous terms. I observe too, from your remarks to me, that the result of your reading also tends to the same conclusion—that what the Arabian and the Persian ships produced in ancient times on their return from India, was *Cassia* and not Cinnamon. These are considerations which lead me to believe, that I am correct in representing Ceylon as the only country‡ which

* In Arian's history of Alexander, although Cinnamon is mentioned as "the produce of a shrub," yet of *Cassia* alone it is stated that it "grew there" (in India)—vol. ii. p. 166.

† "*Nard* and *Cassia* balmy smells."—*Milton.*
"Let balm and *Cassia* send their scent
From out thy maiden monument."—
Herrick's "*Dirge of Jephtha.*"

‡ "The Java Cinnamon is far superior to the Malabar both in quality and appearance, but is not so handsome in the bale as that of Tellicherry, which is always well packed and with clean joints, whilst that from Java is mixed with many false packed canes and ragged joints, and has a stronger drug flavour. *Ceylon is superior in every point of view (colour excepted) to every other description of Cinnamon.* It is perfect in its fine aromatic flavour, in the thinness and regularity of its bark, the length and cleanness of the joints in each cane, &c., &c. Java Cinnamon has made the nearest approach to the qualifications of Ceylon Cinnamon,

produces "Sweet Cinnamon," *(peṇi kurundu*, Siṉ.), contra-distinguished from "Cassia," (*nika kurundu*, Siṉ.)* If this be so, and I may regard it as a well ascertained fact in natural history, that "each tract of country in the world has had its own peculiar creation," the inference that Cinnamon had its origin in Ceylon, is, I conceive, very probable.† It is doubtless from this cause that this spice is so regarded by several writers—that poets have sung of "spicy breezes" in connection with "Ceylon's Isle;" and that the Island itself is termed "*The Cinnamon Isle.*"

Its claims to this designation seems to derive great support from a Sanskrit "Catalogue of Botanical names," called the *Saraswatí Nighaṇḍuva*, a production of very remote antiquity, in which, among other designations, *Saiṅhalan* occurs as a name for Cinnamon.‡ I find from Wilson's "Sanskrit Dictionary," that this name (in a modified form, *Siṅhalá*) is given to Cinnamon even in India—a fact which removes all doubt as to the genuineness of the application, and the origin of the article.

Now, when we bear in mind that nearly all names

---

although it is still a very inferior substitute; it is much weaker in flavour and lacks that fine aroma which is the leading feature in the quality of Ceylon Cinnamon. It is besides very inferior in the quilling."—*Report of Messrs. Kilby and Co., Brokers, London, October, 1843.*

* Baldæus, in his account of Ceylon, describes *Cassia* as the third sort of Cinnamon, called by the Portuguese *Canel de matto*, or 'wild Cinnamon,' which grows likewise on the Coast of Malabar, but is in no esteem. —*Ancient Travels*, p. 824.

† Speaking of 'centres of creation,' Dr. Gardner says, (see Lee's Translation of Rebeiro's Ceylon) that "till the natural productions of different parts of the surface of the globe came to be investigated with the attention and accuracy which are peculiar to the present age, naturalists rested satisfied with the vague idea that all animals and vegetables had originally radiated from a common centre, and that in the same parallels of latitude the same species would be found. This we now know not to be the case; and it can be as safely asserted that both every large tract of country has had its own peculiar creation of plants and animals, as that two and two make four, the exceptions to this general rule being accounted for by disseminating causes now in operation."—p. 211.

‡ It also occurs in another botanical work called the *Siddhácaus Nighaṇḍuwa.*

throughout the East are descriptive,* and that this, which is a possessive noun, bears the signification of "that which belongs to the *Sinhalese*," I am disposed to treat it as a plant indigenous to Ceylon.†

The objections, however, to this are two-fold; 1st, that although so early as in the days of Moses, "Sweet Cinnamon" and "Cassia" were known, (Exod. xxx. 23, 24,) ‡ yet it is not mentioned as a product of Ceylon until after the Muhammadans commenced a traffic in the Indian seas; and 2ndly, that the "Cinnamon regio" of the ancients is described as the *opposite* or *Eastern Coast of Africa.*

For obvious reasons I feel a very great diffidence in advancing an opinion upon this part of the subject, and would therefore merely suggest for your consideration whether the non-mention of Cinnamon until after the Muhammadans had commenced to trade with Ceylon, may not fairly be attributed to causes § other than the absence

---

* Thus, *tippilli* or 'long-pepper,' goes by the name of *Maghada* (Behar) the country where it was originally found. So likewise *China-mul* 'caculia cathertica' or *China-root* is so called after the name of the country from whence it was introduced into Ceylon.

† With less evidence in its favour, Dr. Gardener would have us believe, that the coconut palm is indigenous to Ceylon.—Lee's *Ribeiro*, p. 213.

‡ Dr. Royle, having indicated the routes af ancient commerce, concludes this part of his subject with some remarks on the place whence the articles were brought into Egypt and Palestine; and he says: "But Cinnamon and Cassia, nard, calamus, and onycha having been shewn to be peculiar Indian products, known to ancient commerce—there can, I conceive, be no doubt that the *West Coast of India*, and probably also the Island of *Ceylon*, were reached eyen in the early time." See *Asiatic Journal*, vol. xxxviii. p. 156. As between India and Ceylon, we have already shewn that *Cinnamon* was a peculiar product of the latter country.

§ It may appear strange that so few of the indigenous productions of Ceylon itself are mentioned; that is to say, only precious stones and pearls, without a single allusion to cinnamon and ivory, with which the Island abounds. This apparent inconsistency, however, is removed when we come to consider the very nature of the Sinhalese commerce; and at the same time serves to shew the vast extent and importance of the latter. For, as we have already seen, the trade of Ceylon consisted for the most part in the exchange of foreign goods, brought thither in great quantities from distant regions; in comparison with which the sole produce of the Island itself, would seem very trifling and insignificant. Besides, cinnamon grew only in the interior, and not in the northern parts of the Island, to which alone Sopater's visit was confined; and we

of the article itself in Ceylon, viz., to a deceit practised by the Chinese, who seem to have had before that period a monopoly of trade in the Indian Seas. It is also important to investigate with clearness, whether by "the Eastern Coast of Africa," a part of Asia* was not meant; or whether the former was at this time a port at which the Chinese vessels touched, and from whence the spice itself was exported to other ports in exchange for European and Egyptian merchandize. The great value too, which was set on this article may seem to have influenced the Chinese, like the Arabs who traded in the Red Sea, to withhold the name of the country from whence they obtained it† and, it may not be improbable, on the other hand, (if the Chinese did not conceal the fact,) that the Greek writers took for granted without much inquiry, that the spice, which they procured from the East Coast of Africa, was a product of those regions.‡

The inaccuracies into which the ancient writers seem to have fallen with regard to the Geography of the Eastern Coast of Africa, and the opposite regions in Asia, may also intimate to us such a want of information in the Greek writers, as to render a mistake on their part possible, and indeed too probable; for, amongst a great many errors

must also recollect, that at this early period, gardens appropriated to the cultivation of cinnamon were not yet in existence."—Heeren's *Historical Researches*, ii. p. 425.

* It would also seem that the ancients "confounded Egypt with Abyssinia."—See Sir William Jones's *Works*, vol. i. p. 274. Also Wilford's *Essay on Egypt*, in Supplement to vol. ii. of the same work, p. 544.

† "The Coast of Ethiopia, from the straits to the eastern headland of Aromata, was much better known *after* the time of Ptolemy Philadelphus than it is now to us Europeans.*** There is no doubt that the Arabian possessions must have extended still farther south, perhaps to Madagascar, but they concealed their knowledge from the Greeks."—Laurent's *Ancient Geography*, pp. 349-51.

‡ "The Venetians are thought to have carried on their trade to India with greater advantage than any other nation ever did. They had no direct intercourse with that country, but purchased the commodities of the East, *imported by the Mohammedans into Egypt and Syria*.*** Neither the Greeks nor Romans seem to have visited the more Eastern parts of it (India). They procured the productions of those countries only at second hand."—Dr. Adam's *Ancient Geography and History*, pp. 512-3.

enumerated in Wilford's "Essay on Egypt" and other adjacent countries (see Sir W. Jones's Works, ii. p. 493, *et seq*)., we find that a "part of Africa was called *India* by the Greeks, that Theophylact thought that the Nile flowed through Lybia, Ethiopia and *India*" (p. 544); that Strabo considered that the people of Mauritiana were *Indians* or *Hindús;* that middle India was called *Abyssinia* in the times of Marco Polo; and that Pliny placed Madagascar on the east of Ceylon.

As for the silence of the Ceylonese, it is not at all amazing to me, that a people little accustomed to traffic, and setting no value upon the bark which they did not use either for religious or culinary purposes, omitted to mention the spice in question in any of their books, except their Lexicons or Botanical works, few of which have been spared to us from the ravages of ancient times.*

And this leads me to notice briefly the second part of your inquiry, as to "the uses to which the ancient Singhalese applied this spice." Sacrificial offerings, for which in ancient times Cinnamon was used by other nations, were not known to the Singhalese. Indeed, they seem to have regarded it as fit only for medicine. Thus, we preceive the plant spoken of, not only in Indian medical books of high antiquity, such as the *Shusruta*, but also in Sanskrit and Páli medical writers of Ceylon. The *Sárathasangrahà* of Buddha Dása (A.D. 350,) and the *Manjúsa* (A.D. 1261,)† both mention Cinnamon as an ingredient used as medicine in cases of "snake poison," "elephantiasis," "rheumatism," &c. Except in modern times, I am not aware that this spice was applied by the Singhalese to any other use,‡ and I am

* "Although in the few native works at our present disposal there is no particular mention made of spices, yet we cannot possibly doubt of their consumption in the country itself. This silence, however, is merely the effect of accidental causes; for neither Manu or the Ramayana had any special occasion of alluding to the subject."—Heeren's *Historical Researches*, ii. p. 276.

† Also in the Singhalese *Yogaratnâkaraya*, A.D. 1472.

‡ I must not, however, omit to state that frequent mention is made in the *Mahawansa* of "scented oils," "spices," and "aromatic oils," (see

unable to ascertain any mention of it in the Siṇhalese books except our Dictionaries and the Poets.* (A.D. 1410—1815.)

You will have doubtless read in modern Siṇhalese history, that upon the capture of the late Kandyan King, the lamp in his palace was found to contain Cinnamon oil; but this was probably a luxury, the use of which was borrowed from the Dutch.†

Before concluding these observations, I must not omit to remark that in defining "Cinnamon tree," Prof. Monier Williams in his Dictionary gives the following Sanskrit sentence, which whether quoted from any book of authority, or not, supports the belief generally entertained, that the plant is indigenous to Ceylon—*Purvókta tikta, valkala visishtaḥ Siṇhala-dvipa róhí kshudra vrikshaḥ*. "The aforenamed (is) a small tree (plant) having pungent bark, and grown in the island of *Siṇhala*."

In the following list I have given the significations of the several

Sanskrit Names for Cinnamon and Cassia.

1. *Tvatch*, 'skin,' 'bark,' 'rind,' 'peel.'
2. *Varáṇga*, 'elegant' or 'superior body.'
3. *Bruṇga*, 'a golden vase.'
4. *Chócha*, 'bark,' 'rind,' 'skin.'‡

---

pp. 124, 182,)—probably referring amongst others to *Cinnamon*, the great fragrance of whose bark was certainly known to the natives, from at least the names given to it (*vide* the list of names at the end.) I have also carefully examined the text of the *Mahawansa*, but have found the words too large to enable me to express a decided opinion on the subject.

* එකලවැදිලිසතුල, ඇන්රිඇන්ලමගකො ළ
මදතලවැදවගල, සුවදමල්රොන්පර්න්සුලක ළ *Kavyiasékharaya*.

† But, Baldæus says, that in the beginning of the siege of Colombo by the Dutch, their "General received a letter, writ with his Majesty's own hand," and that "it was curiously perfumed with all sorts of spices."—*Ancient Travels*, p. 720.

‡ These four and the 6th and the 18th, are given in the *Amarakosha*; and it is remarkable that they are all rendered '*woody Cassia*' by Mr. Colebrooke.

5. *Shukla*, 'white,' 'clayed-sugar.'
6. *Utkata*, 'superior,' 'high.'
7. *Saiṇhala*, (given by Pr. H. H. Wilson as *Siṇhala*) 'Ceylon' 'Siṇhalese.'§
8. *Katuparní*, 'pungent leaf.'
9. *Mukhasavrabha*, 'mouth-fragrant.'
10. *Varapriya*, 'highly pleasing,' 'delightful.'‖
11. *Sútkata*, same as *Utkata* with the addition of the prefix *Su* 'very,' 'much.'
12. *Lavana-parna*, 'beautiful leaf.'¶
13. *Lamaṇga*, supposed to be an original Siṇhalese word meaning 'tender body.'**
14. *Phálaguna*, 'frightful,' 'a name of a tree.'
15. *Súra-rasa*, 'highly flavored.'
16. *Mukha-sódana*, 'pungent,' 'sharp.'
17. *Patra-gandha*, 'perfumed leaf.'††
18. *Tvak-patra*, 'bark leaf.'
19. *Gudatvak*, 'sugar-bark.'‡‡
20. *Dáru-gandha*, 'scented wood,' 'Cinnamon.'
21. *Tikta-valkala*, 'pungent bark,' 'Cinnamon.'
22. *Sugandha-tvak*, 'scented-bark.' 'Cinnamon.'
23. *Gandha-valkala*, 'scented-bark,' 'Cinnamon.'§§

---

§ Pr. H. H. Wilson gives this in his "Sanskrit Dictionary" in addition to those given in the *Amarakosha*—all which he translates "*woody cassia.*"

‖ The first ten names are given in the *Saraswati Nighanduwa* for "cinnamon."

¶ The first five, and the 7th, 9th, 11th and 12th, are found in the *Siddhawsadha Nighandu* as the names for "cinnamon."

** This name is the same in the *Páli* for "cinnamon."

†† The two first and the 5th, 13th, 14th, 15th, 16th, and 17th, occur in the *Vásadéva Nighandu* as the names for "cinnamon."

‡‡ Pr. Williams in his English and Sanskrit Dictionary gives this and the 3rd, 6th, 15th, 18th, and 19th as the epithets for "cassia."

§§ The last four are given by the last named writer as synonyms for "cinnamon."

Siṅhalese Names.

1. *Kurundu*, the origin of this word does not appear. Probably it is a proper name, and not an epithet.

2. *Lamaṅga*, from *lama* 'tender,' and *aṅga* 'body,' a word for 'Cinnamon' or 'Cassia.'*

---

* ලමඟකුරුඳු, දෙනැතම්වේකුරුඳුරුක—*Nāmavaliya.*

NOTES ON THE DISTRICT OF BADULLA AND ITS NATURAL PRODUCTS,

By W. C. Ondatjie, Esq., *Assistant Colonial Surgeon.*

The district of Badulla comprehends a no inconsiderable portion of the Central Province; it is in fact of sufficient extent to form a separate Province; and was so regarded when the country was under native Rule; the Government of the District being confided to an officer who bore the title of "Prince of Uva."

The District is bounded towards Ratnapura by Gurumada; towards Hambantoṭa by Bulatgamarálage Kandura; on the Nuwara Eliya side by the Hakgala range of hills; on the side of the Lower Badulla-road by the Uma-oya; on the Batticaloa side by Padu Kumbura or Madura-oya; on the Maturaṭa side by Halgaran-oya; and on the Wallapana side by Madulla. The physical aspect of the whole district is strikingly beautiful, the country being diversified by chains of bold mountains and by undulating hills, which are separated by deep valleys, and extensive plains covered with lemon-grass and low jungle. Rivers and streams as well as springs abound every where, some of them forming beautiful cascades. In fact, the scenery of this part of the country surpasses every other portion of the mountain zone in variety and grandeur.

The most picturesque view is that from Ella, whence one looks down on the low country, studded as it is with nipple-shaped hills of various sizes, and stretching towards Hambantoṭa. On a clear day, the sea itself is visible, and vessels may be sometimes seen passing along the coast.

The hill scenery around the mountain pass of Haputale is unrivalled in magnificence and extent by any other in the Island. Our late Governor, Sir H. G. Ward, has so fully described the view from Haputale, that I quote his own words. He says :—

"I looked with regret, I confess, as I ascended the Pass, probably for the last time, at the magnificent wall of vegetation, towering up the side of the mountain, and about to disappear under the axe of the Planter, while below it, the view embraces the whole Mágam Pattuwa, with the Kattragam hills in the distance,—the Leeways at Bundela, and the white line of surf, beyond, at Kirinda." (Sir H. G. Ward's Minute of Inspection, 1858.) His predictions are being literally fulfilled; already several large Estates have been formed, and the bracing climate will tempt the Planter to remain long here, while the rich soil promises to reward him handsomely.

From Wilson's Bungalow the scene is truly delightful, including an extensive view of deep valleys, and rushing streams, smooth grassy hills that undulate in succession, and mountains whose tops are covered with clouds. The Namanakuli mountain may be seen towering above the others on the Badulla side. From Dewihene Bungalow, (now in ruins,) which is 1,767 feet above Badulla, and 4,110 feet above the level of the sea, an extensive view is obtained of the hills and valleys that stretch below, together with the lofty range of the Nuwara Eliya mountains in the long distance.

From the Kannavarella Estate we gain a view of the sea; and on a clear day, ships sailing along, may be seen. Altogether the view afforded by the variety of objects here is unsurpassed for grandeur.

From Weywelhena Bungalow a full panoramic view of the whole of the valley of Badulla is visible.

From Taldana Pass, 4 miles from Badulla, we notice a

chain of hills, covered with chena cultivation, the highest of which is Nárangala. The lower Badulla-road also may be seen winding along the Badulla-oya. From many other points grand and interesting prospects of the country may be easily commanded.

The town of Badulla is 2,600 feet above the level of the sea. It is 156 miles from Colombo viâ Nuwara Eliya; 84 miles from Kandy; 36 from Nuwara Eliya; 80 from Ratnapura; 76 from Hambantoṭa; and 72 from Batticaloa.

	m.	*furl.*
The distance from Badulla to Attampiṭiya is	13	4
From Attampiṭiya to Wilson's Bungalow	11	2
From Wilson's Bungalow to Nuwara Eliya	13	0
From Nuwara Eliya to Ramboda ...	14	0
From Ramboda to Pusselláwa ...	10	0
From Pusselláwa to Gampola ...	10	3
From Gampola to Kandy	12	5
Distance from Badulla to Kandy ...	84	6

The town of Badulla is situated on a mound surrounded by an extensive valley extending two miles and of an elliptic form, and presenting a series of terraced paddy-fields of about 400 acres in extent, irrigated by the Badulla-oya and the hill streams,—the valley being a basin bounded by chains of hills covered with lemon-grass. Through the whole extent of the valley runs the Badulla-cya, a serpentine river. It enters the valley from the south-west, and as it proceeds towards the north, receives the small tributary streams known by the name of the Kuḍá-oya, Rambapota-oya, and it finally discharges itself into the Mahaveligaṇga.

The Badulla hills are of various elevations, from 400 to several thousand feet above the level of the sea, the highest being 6,700 feet: this is called Namunakuli Kanda, and is situated towards the south of Badulla; on its summit the *Rhododendron* is found growing in great abundance.

Roads and Communications.

The principal roads are the following:—The *Nuwara Eliya road*, which is the only one that affords the means of uninterrupted communication between Badulla and Kandy; on this road bullock carts may be constantly seen; but it is a very tedious and expensive route.

The *Lower Badulla road;* this passes along the Badulla-oya and Mahaveliganga, and over a flat country, and is undoubtedly the shortest to Kandy, being only 56 miles distant. It is intersected by streams which at times are swollen and which therefore render the road impassable during the rainy season. In many places rocks also form serious obstacles, which are not easy to remove so as to make the road passable for carts. The country traversed by this road is thinly populated, owing to the prevalence of fever for which it has gained notoriety.

The *Madulla road.* This is also a short approach to Kandy, but it is steep, narrow and dangerous.

The *Ratnapura, Hambantotta,* and *Batticaloa roads.* These lead to the low country.

The *Ratnapura road* runs over a comparatively flat country in a south-west direction. If this road be open for carts it will greatly facilitate communication with Colombo; while there will be provided also a cheap route from it to the Sanitarium of the Island, and in many other respects the country will be benefited. On each side of the road there is rich pasture land. It is studded too with numerous and populous villages. This ought to be the proper outlet for the District.

Sir H. G. Ward, who had personally inspected all the different lines of communication with Badulla observes in his Minute of Inspection of 1859, that, "The Haputale road still continues to be the favorite object of the Planters. The large amount of land sold near Haputale (5,000 acres), and the increase in the Coffee Crops of the

Badulla District which has risen from 10,000 cwts. in 1855 to 20,000 cwts., and would probably advance much more rapidly, if a better line of communication with Colombo were opened, give to this proposal a greater claim to consideration than it had when first brought before me."

The *Hambantota road* which runs southward, is in some parts very steep and extremely difficult to be converted into a cart-road.

Batticaloa road. Carts may proceed twelve miles from Badulla: beyond that distance it is a mere jungle path used for tavalams. It proceeds in a north-east direction.

The *minor roads* are numerous, branching off in various directions to the villages around.

The whole aspect of the District is rapidly undergoing great changes. Numerous Coffee Estates are springing up in all the available land adapted for the cultivation of this staple article of the Commerce of this Island: consequently the District is attracting great attention, and it becomes necessary, that its interests be carefully studied. But it must be observed that the improvement of the country has not kept pace with its extent and importance as a Coffee growing district. This has been owing to two causes. The distance from the sea coast is considerable, and travelling by the great mountain pass, *viâ* Nuwara Eliya, is both tedious and expensive, the progress therefore, of the District, has been much retarded. It labours under the disadvantages consequent on the want of easier and cheaper transport and the town is not so large and important as it ought to be, considering the large capital laid out in the District for the production of Coffee. The rate of transport is very high; cart hire from Badulla to Colombo varies from £6 to £7 *viâ* Nuwara Eliya, and a cart takes longer to reach Colombo than the Overland Mail to England: and even then it is attended with uncertainty and losses, especially during the wet weather. Owing to the expense and difficulty of trans-

port, trades-people and others are discouraged from settling in Badulla, which of course renders living fearfully expensive, every article of consumption being at an exorbitant price. But with the many difficulties to be contended with, I have yet had the pleasure, since my residence in Badulla, of witnessing many material improvements. New roads and bridges to facilitate communication with the district have been constructed; while the extension of the means of Irrigation is proving of pre-eminent service to the native population. Facilities are thus being afforded for bringing waste land under cultivation, and for the extensive production of paddy, which is the staple article of food among the people.

To no cause more than the unremitted zeal of the late Assistant Government Agent of Badulla,—and this is acknowledged throughout the District—are the improvements of the works of Irrigation to be attributed.

CLIMATE.

There are three seasons. First, the *Dry weather*, which commences in May and continues till the end of August: second, the *Wet weather*, which extends from September to December inclusive; and the third, the *Cold weather*, from January to the end of April. Of these four months of cold weather, the first two are the coldest. It may be stated that generally the thermometer ranges 84° in the shade during the usual dry weather: in the rainy season it is about 80° and often in the mornings as low as 58°; and in the cold season it is 56°, and on the hills it has been observed to be as low as 51°.

The winds blowing in a north-easterly direction are generally cold and bracing, but they become hot and oppressive from May to September, which are the most unhealthy months of the year, especially if there be unusual heat and drought.

HEALTH.

The low lands of the District are generally unhealthy, arising chiefly from the scarcity of water and food—causes which have tended to the gradual depopulation of this part of the District. Scrofulous ulcerations are frequently met among the natives of Wellaváya, &c. Those parts of Badulla which stretch towards Hambantoṭa and Batticaloa are well-known as fever generating places.

Intermittent fever, or ague, is endemic in Wellaváya and Wellassa, which have a sandy and barren soil, and where wholesome water is scarce. The disease is become so common with the wretched inhabitants of these localities, that they consider themselves subjected only to a temporary inconvenience during the paroxysm, and when that has passed off they betake themselves to their usual avocations. Many of them have enlarged spleen as the consequence of protracted suffering from ague, and present the peculiar exsanguineous appearance which is characteristic of the disease.

Ague is also prevalent at Kataragama, whither people of every part of the Island and from the neighbouring continent of India, Buddhists as well as Hindús, resort annually in the month of July on pilgrimage to a Déválé, which is sacred to the God Kandasvámi.

The Kataragama fever although generally of the intermittent type, soon merges into the remittent character, and destroys great numbers of the pilgrims, when cholera does not break out among them, as is usual on such occasions.

According to the Siṅhalese idea of treating some severe cases of fever, no medicine is to be administered until some days have elapsed, when, unfortunately, the fatal symptoms have already supervened. Thus numbers die immediately after their return from the Kataragama festival.

I would here offer a few remarks on an indigenous febrifuge

plant, which I consider, after extensive and most careful trial, to be an efficacious medicine for fever. This statement may be startling to some, especially as the plant belongs to the *Cucurbitacea*, which have not a single member possessing any febrifuge properties, but as it is well-known, furnish some of the most powerful cathartics of the Pharmacopœia.

The plant in question is an annual creeping plant, and is known by the name of *Trichosanthes cucumerina*, Lin.; in Singhalese it is called Dummélla, and grows plentifully in the feverish parts of Uva. It yields to boiling water a bitter principle almost like Gentian or Cherayta. The chemical composition may be thus stated. It contains Tannic Acid, which is also one of the principal constituents of the best kind of Cinchona bark. Bichloride of Mercury throws down a precipitate which is also a test for the Cinchona alkaloids.

An infusion of the dried plant is the form in which I use it, after the bowels have been freely moved by a dose of Pulv. Jalap Comp. or Senna and Epsom Salts.

Infusion of Trichosanthes Cucumerina.—Take of the dried plant, leaves and stem one ounce, boiling-water two pints. Infuse four hours in a covered vessel and strain. I use a copper decoction pot.

Dose two ounces, three times daily. It may be given during any stage of intermittent fever; when given in the cold or hot stage, I have found it efficacious in abating the severity of the symptoms. No more than the quantity required for each day ought to be prepared at once, as the infusion begins to ferment when kept beyond a few hours:—

The health of the District is in no small degree owing to the frequent showers of rain that fall over its whole extent. When there is a cessation of these showers, and dry and hot weather succeeds, much unhealthiness is the consequence, and it is then that epidemics break out.

As may be expected when there is a deficiency of the pluvial supply, the high temperature thus caused generates malaria,—the surrounding jungle giving rise to this, and sickness thus prevails: whereas showers of rain refresh the air, absorb the malaria rising from the ground, and thus remove morbific influences.

The people who inhabit the highlands of the District are remarkably healthy and vigorous, being supplied with abundance of water and food.

With regard to the health of the European settlers, an experience of seven years in medical charge of the station, has convinced me that the climate of the Badulla hills is not inimical to their constitution; for I have had no case of Dysentery or other disease depending on climate, occurring among them; and I think the climate of Badulla is certainly more favourable to the health of the Planters than that of the Kandyan Districts. More healthy, active, energetic men are seldom to be met with anywhere else.

POPULATION.

According to the Census of 1859, this amounted to 44,642 males and 38,619 females: total, 83,261. The decrease of the population, especially of the low lands, is evident, and is proved by the remains of former Architectural Buildings, which shew that this part of the district of Badulla teemed with a numerous and industrious race of men, whose existence is thus mournfully attested by the traces of a departed greatness.

The subjoined extract from a Report on the present condition of Bintenna, by J. Bailey, Esq., Assistant Government Agent of Badulla, well describes the condition of the country and the character of the scanty population still surviving amid their ancient ruins.

"Now everything is ruinous, and daily becoming more ruined, except the Dágoba, which, during the last three years, there has been a violent

effort to restore. The jungle is encroaching on the once broad street: the slovenly hovels, wretched enough in their best style, are tumbling down—their walls cracked, their roofs falling in: here and there, a half-built house seems to shew an effort at improvement, given up in despair; and, over the place there is an air of desolation, which is inexpressibly melancholy. The people, too, are, for the most part, wretchedly poor and miserably inert."

Principal Divisions.

1. *Uḍukinda*, or Upper Úva includes Uḍapaláta, Dambavinipaláta, Gampaha Kóralé.

2. *Meḍakinda*, or Middle Úva, Mahápaláta, Dehivinipaláta, Kumbalvalapaláta.

3. *Yaṭikinda*, or Lower Úva, Bógoḍapaláta, Rilpalapaláta, Beduḷapaṇguva, Passara Kóralé, Kandukara Koralé, Paṭṭipola Kóralé.

4. *Viyaḷuwa*, includes Oyapaláta, Soraṇátotapalata, Pitakola, Ḗtulkoḷapaláta, Palwatta.

5. *Bintẹnna*, includes Bintẹnna, Araḷupiṭpaláta.

6. *Vellassa*, includes Wégampattuva, Nilgalapaláta, Meḍagampattuva, Dambagallapaláta, Nikavẹṭipaláta, Mahávẹdiraṭa.

7. *Yatikinda*, includes Buttalarata, Deyanagapaha, Paṇḍikkulama, Sittarama and Kataragama, Kóṇgala, Bintẹnna, Kandapalla Kóralé, Wẹllaváya.

Number of Population in each Division framed on an official Return for 1853.

	Males.	Females.	Total.
1. Uḍukinda ...	5,627	4,584	10,211
2. Meḍakinda ...	2,214	2,485	4,699
3. Yaṭikinda ...	6,520	5,218	11,738
4. Viyaḷuwa ...	4,181	3,701	7,882
5. Bintẹnna ...	2,399	2,080	4,479
6. Vellassa ...	7,374	5,569	12,943
7. Yatikinda ...	3,639	3,480	7,119
Total ...	31,954	27,117	59,071

Rájakáriya OR COMPULSORY DUTIES UNDER NATIVE RULE.

It will be seen by the subsequent remarks, that every thing produced in the District was attained by a regular system of compulsory labour, which alone seems to have led the people to betake themselves to industrious pursuits; nay, the very personal comforts of the Royal family were administered to by such labour imposed on the inhabitants.

From some of the old natives of Badulla, I have ascertained a number of such *rájakáriya* as were formerly performed in the District, notice of which may perhaps not be altogether uninteresting in connection with the subject of this paper.

1. *Hunu rájakáriya.*—To burn lime or chunam. This compulsory duty was performed by the people of the village called Hagilialle and in their own village.

2. *Hakuru rájakáriya.*—To make jaggery from the kitul palm. A work performed by the villagers of Kumbalvela and in their own village.

3. *Ágará.*—To dig for precious stones. It was performed by the people of Yaṭapaláta at and near Nuwara Eliya, namely :—Vilmane, Sita Eliya, Bopattaláwa, Lindsoluva and Palalmana.

4. *Pili viyanavá.*—For weaving clothes from a species of shrub cotton which is carried on to this day at Kandapalla. Those of Uḍapaláta performed it in the village itself.

5. *Tel rájakáriya.*—Collecting oil seeds, which was performed by the people of Úva, and the oil extracted and sent to Kandy.

6. *Miris rájakáriya.*—The people of Viyaḷuwa were to collect chillies and send them to Kandy.

7. *Daḷumura-rájakariya.*—The people of Passara,

Aṇgoḍa, Uḍuvera, Panakana, also from Bombaraboṭuva in Sabaragamuwa supplied the King, at Kandy, with betel leaves.

8. *Yakaḍa rájakáriya.*—To smelt iron and manufacture steel. This was performed by the people of Kandapalla in their own village, and at Sabaragamuwa.

9. *Íraḍu paṇguwa.*—To make bows, arrows, rice pounders, handles for lances, and flagstaffs which should have been beautifully lacquered. This was made by the people of Wadecona at the same village.

10. *Ḷunu rájakáriya.*—To manufacture saltpetre. The people of Lunugala proceeded to Gampaha for the purpose.

11. *Kuruveṭṭó.*—Elephant suppliers. The people of Tuppittia supplied elephants.

12. *Wagapaṇguveṭṭó.*—To search for Elephants. The people of Pussalgolle did the work.

13. *Aḷutpanneṭṭó.*—To blast rocks. The people of Aḷupanna Kumbura blasted rocks wherever they were called to do so.

14. *Sarakku dakvanavá.*—To cultivate condiments, &c., such as coriander, cummin, fennel, dill seed, ginger, anise, cress, or rata-aba: peas, kodomba, or barley. The people of Tennekunvela situated in Uḍukinda Uḍapaláta were to cultivate them. They were also cultivated at Maturaṭa and Bómbara, near Nuwara Eliya. Rája Ráma was a Malabar who was employed to cultive the condiments.

15. *Bétgé.*—There were two Medical Stores, one at Badulla and the other at Kandy, which were supplied by the people of Badulla.

And a numbers of others of less importance.

Coffee Estates.

The Coffee Estates lie in two different directions, namely, on the Badulla side, and the Haputale range.

Those on the Badulla side are:

Vévelhínna	7½	miles from	Badulla
Ótumba	do	„	do
Pepolgashínna... ...	do	„	do
Gavarakelé	8½	„	do
Pupulé *or* Návela ...	10½	„	do
Kannavarella	12	„	do
Gavarakelé East ...	12	„	do
Beddegama (Spring Valley)	7½	„	do
Balagala	3	„	do
Glen Alpine	4	„	do
Kóttagoda (Maryland)	4	„	do
Vevessa	5	„	do
Debedda	8	„	do
Passara	12	„	do
Gónákelé	12	„	do
Anggoda	12	„	do
Redipána	2	„	do
Elizabeth	2	„	do
Hinggurugomuva ...	3	„	do
Náranggala	8	,	do
Unagala	3	„	do
Gónágaltenna	7	„	do
Dikbedda	10	,	do
Uduvara	7	„	do
Kínakelé	12	„	do
Hindagala	12	„	do
Mávalamedda	3	„	do

On the Haputale side are:

Kahagolla	25	miles from	Badulla.
Haputale	27	„	do
Sherwood	28	„	do
Galkanda	29	„	do
Viháragolla	30	„	do
Fenton	33	„	do

Haldummulla	... ...	35 miles from	Badulla
Lot No. 10	... ...	35 „	do
Kalupahana	... ...	35 „	do
Needwood	... ...	37 „	do

5 Estates opening at Lemastoṭa.

3 Estates at the back of Wilson's bungalow.

The elevation of the Estates above the level of the sea, is from 2,400 to 4,800 feet.

The Badulla Estates which lie in an easterly direction are situated on spurs running out from Namunakúli-kanda, while those in a south-westerly direction are on the Haputale side.

The quantity of Coffee produced in the district is about 23,000 cwts. The heavy blossom appears in August and September. The principal crop is picked from April to July. A small crop, chiefly from young Coffee, is picked from September to December.

Transport of Coffee.—The produce is sent down to Colombo from April to September. The only road by which Coffee is sent by carts to Colombo is the Nuwara Eliya road. The general rate for a bushel of Parchment Coffee is 2*s*. A cart can take from 60 to 80 bushels, and in fine weather it reaches its destination after a journey of from 20 to 40 days. The wear and tear on this road are very great, to say nothing of the distance of 156 miles, to be travelled over a steep mountain pass. It is not unusual to see cart loaded with Coffee lying at the bottom of a precipice while the bullocks which had brought them have died from exhaustion. It is not likely that the cost of transport by this route will ever become less. It is sometimes enormous.

The Hambantoṭa and Batticaloa roads are used for the transport of Coffee by tavalams. For a bushel of Parchment Coffee 1*s*. is charged: a bullock load is equal to 3 bushels.

A small quantity of Coffee is also sent by the road to Ratnapura. The importance and utility of this road as the proper outlet for the district, are now greater than

ever to the planting community, on whom the advancement of the district depends so much. The necessity therefore for opening it for wheel traffic cannot be overrated. With such a road in existence the whole of the Coffee produced in the district will be sent through it, and the serious losses from long detention and consequent damage of the Coffee will be prevented.

The Coffee which is sent to Hambantoṭa is shipped at that place from October to April, and that which is despatched to Batticaloa, from April to September.

The rate labour, &c., on the estates varies from *7d.* to *9d.* per day, and on an average from 4,000 to 5,000 coolies are employed.

Roads to the Estates.—Some of the minor roads to the estates are in an unsatisfactory state. They are not only dangerous to travellers on horseback; but it is even difficult to send down the crop by them from the estates. This is owing to the rocks and the stones which are scattered about, and to the roads being cut up by water during wet weather.

COFFEE LAND IN THE BADULLA DISTRICT.

	Acres.	Acres.
Namunakúli, &c.:		
Lands belonging to private parties ...	9,176	
Surveyed, yet unsold	1,282	
Unsurveyed, belonging to Govt., about ...	3,000	13,458
Haputale:		
Lands purchased by private parties ..	13,196	
Advertised, not sold	1,539	
Unsurveyed, belonging to Govt., about...	20,000	34,735
Wilson's Bungalow:		
Lands purchased	—	486
Valapana or *Udapussellāwa*:		
Lands purchased	9,216	
Surveyed, yet unsold	1,176	10,392
Unsurveyed, belonging to Government, extent unknown...	—	

		Acres.
Náraṇgala:		
Lands purchased	—	1,704
Madulsima, &c.:		
Unsurveyed, estimated by a Government Surveyor at 14,000 acres, but believed to exceed	—	30,000
	Acres...	90,865

31st December, 1860.

Vegetable Products.

The Agricultural productions of the Natives for 1855 and 1859.

	1855		1859	
Paddy ...	481,849	bushels.	280,758	bushels.
Fine Grain ...	90,316	do.	16,593	do.
Coffee ...	77,197	do.	64,579	do.
Pepper ...	685	do.	465	do.
Mustard ...	16	do.	22	do.
Gram ...	201	do.	10	do.
Indian Corn	4,667	do.	16,388	do.
Cotton ...	3,817	lb.	1,001	lb
Tobacco ...	7,850	do.	2,020	do.
Onions ...	12,550	do.	5,800	do.
Potato ...	100	cwt.	8	cwt.

These figures have been obtained from official returns for 1855 and last year. I have inserted them here to give an idea of the quantities produced in the District.

1. Vegetable Products used For Food.

1. *Starch.*

Cassava.

Arrowroot.

Kitul Sago, from the Jaggery palm.

Madupiṭi, from the Cycas Circinales.

Kurakkan, Eleusine Coracana.

Italian panicle, Setaria Italica, (Siṇ. *tanahál*).

Millet, Panicum Milliaceum, (Siṇ. *iddal iriṇgu*).

Black Uḷundu, Phaseolus max :
Green Gram, —— radiatus (Siṅ. *muṇḍa*).
Bengal Gram, Cicer Arietenum, (Tam. *kaḍalai*).
Madras Horse Gram, Glycine Tomentoso (Siṅ. *koḷḷu*).
Indian Corn, Zea Mays, (Siṅ. *iriṅgu*).
Potatoe.
Edible roots.

2. *Condiments.*

Fennel, Nigella sativa, (Siṅ. *kaḷudura*).
Coriander, Coriandrum sativum, (Siṅ. *kottamalli*).
Cummin, Cuminum Cyminum, (Siṅ. *maháduru*).
Dill Seed, Anethum Sowa, allied to Díll Seed.
Ginger.
Mustard.
Black Pepper.
Cardamom.
Garlic.
Anise, Pimpinella anisum, (Siṅ. *asamódagam*).
Onion,
Capsicum.
Turmeric, Curcuma longa.

II. USED IN THE ARTS.

1. *Gums and Resins.*

Gum of the Wood-apple, Feronia Elephantum.
Gum Kino, Pterocarpus Marsupium.
Gamboge, Garcinia Morella, (Siṅ. *gokaṭu*).
Black Varnish, Semicarpus Gardneri, (Siṅ. *baduḷu-gaha*).
Gum of Satin Wood, Chloroxylon Swietenia, (Siṅ. *buruta*).
Gum of Ebony, Diospyros melanoxylon, (Siṅ. *kaḷuwara*).
For a description of the Gums, see Asiatic Society's Journal for 1855, p. 71.

2. *Oils.*

Gingeliy Oil ; obtainable from Viaḷuva
Castor Oil : common.

Ceylon Oak oil, Schlerichera trijuga : from Viaḷuva : fruit ripens in October and November.

Mustard Oil ; common.

Kękuna Oil, Aleurites triloba : common ; fruit ripens in April.

Cinnamon suet ; extracted from the fruit.

Gamboge oil ; extracted from the fruit.

Wild Nutmeg Oil ; extracted from the fruit.

Kuḍadavula Oil ; ditto ; fruit ripens in September.

Maḍol Oil, Garcinia echinocarpa : fruit ripens in September and October.

Mihiriya, Isonandra Sp. : fruit ripens in October.

Kina oil, Calophyllum tomentosum : ditto : fruit ripens in September and October.

Domba Oil, Calophyllum inophyllum ; from Velassa.

Telambu Oil, Sterculia fœtida : from Teldeṇiya.

3. *Dyes.*

Indian Madder, *or* Munjeet, Rubia cordifolia.

Indigo, Indigofera tinctoria.

Sappan, Cæsalpinia sappan.

Arnotto, Bixea orellana.

Morinda, Morinda exserta.

Turmeric, Curcuma longa.

Buḷu, Terminalia bellerica.

Korakaha, Memecylon umbellatum.

Milkhedge, Euphorbia tirucalli.

4. *Fibres.*

Niyanda, Sanseveira zeylanica.

Pine Apple, Ananassa sativa.

Mudar, Calotropis gigantea.

Plantain, Musa paradisiaca.

Nettle, Urtica heterophylla.

Horse-hair-like fibre of the Kitul, Caryota urens.

New material for the manufacture of Paper.

Barks for bagging, from the Entada Pursætha ; Gyrinops walla ; Gnidia eriocephala ; Antiaris saccidora (Sin. *ritigaha*) ; Pandanus odoratissimus, &c.

ANIMAL PRODUCTS.

Lac, Chermes Lasca.
Wax.
Honey.
Chetah Skins.

MINERALS.

Lime Stone.
Corundum, or Cinnamon Stone.
Talc.
Plumbago.
Iron Ore.
Sulphuret of Iron.
Saltpetre Earth.
Plastic Clays.

I shall briefly notice some of the remarkable natural products indigenous to the district.

VEGETABLES.

It has been justly observed by an eminent authority, that "However luxuriantly a country may be covered with valuable plants in the wild state, it is only by special culture that the thousands of textiles we require can be furnished. The existence in the wild state of such plants afford sound foundation for the presumption, that these, when cultivated under similar conditions of climate and soil, will reward the labour of the husbandman."*

Meal Sago, from the Jaggery Palm.—This is deserving of attention as an article of diet, being found in the district of Colombo also. But a better mode than that known to the natives must be resorted to to render it clean and pure. As prepared by the natives, it is of a brown colour, mixed with pith and the woody fibre of the stem.

A superior article can be manufactured by pounding the pith when fresh, and straining it through cloth in

* J. Forbes Wilson, A.M., M.D., Reporter on the Products of India, in Journal of Society of Arts, 10th May, 1860.

a large vessel containing water. A good deal of astringent matter will be found in the starch, to which it gives a brown colour. This may be removed by mixing the starch with the white of eggs, which precipitates the tannin, and by straining again the fine pure starch may be obtained. It will be found more glutinous than common sago.

In the month of January, during the rainy weather, the Kitul abounds with starch, which, however, is not found in every tree. The natives discover its presence in a tree by the whiteness of its leaves and petiole, also by boring a hole in the stem and extracting the pith. The Siṇhalese make use of the flour for food after boiling it in steam, which changes it into a gum-like mass.*

Kitul Jelly.—Dissolve a tea spoonful of the starch with a little cold water, and pour over it four ounces, or two wineglassfuls of boiling water, and keep stirring till it jellies; then flavour it with milk and sugar.

Madupiṭi, from the *Cycas Circinalis.*—The Siṇhalese in the Uva District prepare from this an inferior kind of starch. The fresh kernels are cut in slices and well dried in the sun, before they are fit for use: otherwise they have an intoxicating effect and produce vomiting and diarrhœa. The poorer classes generally use the flour, which is prepared by pounding the kernels. It is also boiled in steam and eaten by patients suffering from bowel complaint and hæmorrhoids, for which it is highly esteemed by the natives as the best medicine. I have given the flour made into porridge in cases of chronic dysentery, and from the few trials that I have made, I think favourably of its effect, in restraining inordinate purging such as is often beyond the control of the usual astringent medicines. The tree grows plentifully in Viaḷuwa.

Barley was also cultivated in parts of Uḍukinda in the vicinity of Wilson's Bungalow, by Brahmins, who went

* *Vide* Observations on the Vegetable Products of Ceylon, p. 33.

under the designation of "*Rájakáriya*," and who were employed by the King of Kandy for the purpose. It was first cultivated in Tennakón Vela, and is now found in Ambavela and Waugala. In the last-mentioned place it is still cultivated by the descendants of the said "*Rájakáriya*" who are now become Siṉhalese by intermarriage. It is called *kotomba*, or *yava*, and is cultivated in October and November, and gathered after seven months. The soil is manured with cow dung.

From the seeds of the *Nymphœa stellata*, the people at Bintẹnna prepare starch, which they use during times of scarcity. They also use a decoction of the seed in dysẹntery. The seeds are collected from tanks from June to September.

The process by which Kitul toddy drawers in Úva increase the flow of the juice of blossoms, or force it out from unproductive ones, deserves to be noticed:—The process is called "*Kitul mala behet tiyanavá.*"

Black pepper, ginger, burnt coconut, or old dried coconut, garlic, and chilli, are all roasted together, and being ground with the juice of a kind of lime, *nasnáran*, the mass is made into a ball. Then take the leaves of a species of Arum called in Siṉhalese *sudu ala kola* and boil them in a little of the lime juice. Make five pegs an inch long of five varieties of lime wood, which they call *paspẹngiri-ul-paha*, and two pegs of Cinnamon wood, and a tree called *Itta*. These pegs are only used to increase the flow of the juice. But to force out the juice from unproductive blossoms, drive into the flower stalk two pegs of *ratnẹtul* (PLUMBAGO ROSEA) and *aṉkenda*.

When the pegs are ready, cut a groove into the flower stalk, three inches long, one inch deep, and one inch broad. To the half of the groove near the stem apply the spice ball above described; to the other half, the boiled leaves of the Arum, into which the pegs are to be driven,

and roll a piece of mat over the stalk and cut out a ring from the spadix an inch from the stalk. Apply a quantity of ashes of Areca leaves and *akmala*, which being well mixed with the syrup of the kitul juice is rubbed over the part of the blossom which had not spread out, and allow to dry four days: on the other part of the flower roll down the bark of the *Naha* (GNIDIA ERIOCEPHALA) and then cut off the end of the flower, four days after which the juice begins to flow.

A kitul flower lasts two months, sometimes three. A flower yields four seers of toddy in twenty-four hours. It is very important to select the flower at the proper time; if it be too young or too old, no juice will be obtained. The best time for cutting is when it forms a curve and bulges out like a plantain flower.

I have since heard that a similar process is had recourse to in the Colombo District.

CONDIMENTS.

Nearly all the condiments that I have enumerated above are produced in Udakinde; in former times they were cultivated by Malabars who were employed by the King of Kandy, and received from him grants of land for that purpose.

GUMS.

Among these the Gum *kina* may be briefly noticed. In 1853, I first pointed out that the tree yielded the gum kina of Commerce. I drew public attention to the subject in a letter published in the *Ceylon Times* in April of the same year. It is true that the tree is mentioned in "Moon's Catalogue," page 52, but he seems not to have been aware of its useful properties.

I submitted specimens of the gum to the Chamber of Commerce, and they reported that it was of "good quality." It is sold in the London market at from 25*s*. to 47*s*. per cwt.

The difficulty of obtaining large quantities has arisen from the difficulty of securing the services of the Siṉhalese to collect it.

The tree is found at Aṉgoḍa, near Badulla, Teldeṉiya and Nilgalla or the Park.

Black Varnish is produced from a species of *Semicarpus*. This gum resin is equal to the black varnish of China for the purpose of lacquering. It exudes spontaneously from the stem and branches, and may also be obtained by making incisions in the bark. The resin is hard, breaks with a smooth shining fracture, burns with a bright flame, melts in fire, is soluble in turpentine, insoluble in water, and adheres strongly to wood and metal. The fresh juice is very acrid, inflaming the skin, and producing pustules.

To a saturated solution of Vateria resin (*Hal-dummala* of the Siṉhalese) in oil of Turpentine, add by degrees small pieces of the black resin; put it into a bottle and shake it well until the whole is dissolved. Strain, and then apply it to wood or metal.

It belongs to the same natural family of plants as the Varnish tree of China and Japan, and possesses the same acrid properties when applied to the skin in a fresh state, as it exudes from the bark.

The resin exudes from natural fissures of the bark, and at first white, becomes afterwards black by exposure to the sun, hardening into masses of different sizes. The juice also drops on the ground around the tree forming flattened pieces of resin. My attention was drawn to this tree while stationed in Badulla in 1852. A soldier was cutting firewood in the neighbourhood of Badulla, and among other trees he felled the *Badulla-gaha* tree. The juice spurted out at each cut of the axe on his fore-arm; he returned home and washed himself; the next day he felt an itching in the arm, in the evening it was swollen red and painful; next morning he was unable to wear

his jacket and went to Hospital, a pustular eruption not unlike that produced by Tartar Emetic ointment having broken out in the places where the juice had touched the skin. He rapidly recovered, however, by the application of warm fomentations and olive oil.

Now this corrosive property is the same as that which is described by Rumphius as belonging to the Varnish tree of Sumatra and the Eastern Isles. He says:

"The exhalations of this tree are considered noxious, and the people of Macassar and other parts of Celebes in particular, entertain such a dread of it, that they dare not remain long, much less repose, under its shade. They say, that whoever receives the droppings from it will have his body swelled, and be afflicted with malignant sores. As, however, it furnishes the celebrated varnish, other people boldly repair to this tree, particularly the Chinese and the Tonquinese, who employ great precaution in collecting the resin, which is accomplished in the following manner. A number of Chinese proceed about evening to the place where the trees grow, which is always at a distance from the resort of man or animals; each selects a few, and inserts into the trunk two pieces of bamboo, sharpened at their points in such a manner as to penetrate the bark in a somewhat oblique direction. These remain all night, and are extracted before sun-rise the next morning, the tree yielding no juice during the day. The resin is found in greater or less quantity, according to the richness or poorness of the soil, and is obtained only at certain seasons of the year, particularly about the time of flowering. The people who collect it unite the fruit of their labor, and afterwards make a complete division of the whole, on which account this resin maintains a high price, a single pikul (containing a hundred catties) selling in those provinces of China which do not possess this tree, for two or three hundred dollars; in Tonkin and Camboja, however, it may be had for thirty, fifty, or sixty dollars. It is a custom among the Chinese when they approach this tree, first to rub the trunk lightly, before inserting the bamboo, wishing by this to shew that they are not afraid, for they say, that timid persons will sooner feel its noxious effects than those who are bold and fearless."

This tree is found growing both in low-lands and high-lands. In and around the Cinnamon Gardens; at Awisá-

wélla, Kuruwiṭi Kóralé, at Haṉwęlla, in the Three Kóralés, and at Aṁbagamuwa, and in the Badulla district.

Gamboge.—The Gamboge tree grows plentifully, but the natives seldom extract its valuable gum. They extract oil from its fruit, which ripens in August, and use it for culinary purposes.

Oils.

The solid oils which are common in the district are the "Cinnamon suet," obtained by boiling the Cinnamon fruit. "Gamboge oil," also by boiling the fruit.

The wild Nutmeg (*Myristica tomentosa*) likewise yields a solid oil by boiling the kernel.

The *Maḍol* oil (*Garcinia echinocarpa*).

Meheriya oil (*Isonandra*, Sp.), are also fatty oils.

All these oils may, I think, be applied to the manufacturing of Soap.

Dyes.

Indian Madder, or Munjeet. Among dyes, the Madder is the most remarkable. It grows in abundance in and around Badulla in scattered groups.

The natives have never used it as a dyeing plant, being wholly ignorant of its useful properties; they look upon it altogether as a weed.

In the early part of 1853, I submitted specimens to the Ceylon Chamber of Commerce. The plant grows in moist situations, the soil being a vegetable mould.

The valley of Badulla is remarkably fertile, abounding in limestone, and plants growing in such localities generally yield a beautiful bright red dye.

As the plant has hitherto been known to grow only in a wild state, time and experience will be required before the mode of cultivation best suited for it, can be ascertained. Excellent specimens of the root of the Madder grow in

Gampaha near Uḍapusseḷḷáwa. Specimens of the plant with a drawing of it were forwarded to Government, who sent them to the Chamber of Commerce in December 1853.

The drawing consisted of two parts, No. 1 represented all the parts of the plant to identify the species, with magnified views of the flower, and section of the fruit. No. 2 shewed the appearance and ramification of the root, so that its commercial value might be indicated Both parts of the drawing were of natural size.* The Indian Madder is not so valueless as some would make it appear. We learn from a high authority in such matters, that "the Madder is produced in Nepaul and in various districts of India. That which is brought to England, is imported from Culcutta, and is cultivated in the high lands about Natpore in Purneah. The roots are long and slender, and when broken appear of a red color. It is used in dyeing; the red which it produces being, though somewhat peculiar, nearly the same as that produced by European madder."

Dr. Bancroft says "that upon wool, or woolen cloth, its colour is brighter and livelier than upon cotton or linen; and, when proper mordants are used, nearly, perhaps quite, as permanent."

It is stated in the Jury Report, "that specimens of madder grown in localities deficient in lime were considered inferior." The Reports of the Juries of the Great Exhibition of 1851, on Indian Madder, are encouraging; they state, "that the Indian Madder is a valuable dye stuff, and hitherto not so well appreciated as it deserves, for some of the colours dyed with it are as permanent as those dyed with European Madder, and even more brilliant; its use is, however, gradually increasing, and it is unquestionably well worthy the attention of dyers.'

For the following Oriental names of the Madder plant

* For a full description of the Madder plant as found in Badulla, see "Observations of the Vegetable Products of Ceylon," page 17.

with their derivations, I am indebted to my brother, the Rev. S. D. J. Ondaatje, of Mátara.

Manjéttha—from the verb (මජ) *Maja*, to cleanse or purify, —and (ත්ත) *tha*, the participial termination of the feminine gender. This verb, besides its ideal meaning, conveys the notions of clearness, and brightness, and is used to express ideas connected with such qualities; hence the terms for red and redness come from this verb. In Pali, *Mañjéṭṭha* (මඤ්ජෙට්ඨ) means red; hence the creeper is called by that name: the quality of redness being expressed by the term.

Vikasá, (විකසා), from *vi*, a preposition, and *kasá*, to glitter, participial adjective, having a causal meaning: that which causes to shine, or glitter, or sparkle; hence a plant by which a bright red colour is imparted. These two words, (*Manjéttha*; *Vikasá*,) have the same signification in Sanskrit.

Raktáṅgi (රක්තාඞ්ගී). This means a red body: *rakta*, red; *aṅga*, body or limb; and is applied to the plant.

Padmaká, (පද්මකා). *Padma* means the red lotus; hence *Padmaká* is, having the property of redness, resembling the red lotus.

Vastrabhúshaṇa. (වස්ත්‍රභූෂණ). This means, that which dyes cloth: *vastra* cloth or vestment; *bhúshaṇa*, that which adorns or beautifies.

Raktayashṭi, (රක්තයෂ්ටි): *rakta*, red; and *yashṭi*, stem; hence the word means, that which has a stem whose property is to impart redness.

Elu Names.

Veḷmadaṭa. (වෙළ්මදට): *veḷ*, a creeper; *madaṭa*, red; hence a red dye imparting creeper. This is a derivative from the Pali, *mañjéṭṭha*.

Samaṅgá, (සමඞ්ගා), means that which unites or blends with, and so a plant yielding a dye that colours any substance, by union with it.

Yójanavalli, (යොජනවල්ලි), means a creeper of the length of a mile; *yójana*, a mile, and *valli*, a creeper; because the creeper is of great length; a very appropriate name, seeing that the stem creeping on trees forms an interminable net-work.

Sapan wood, is found in abundance in Wellawáya, from whence it is taken to Hambantoṭa for exportation.

Morinda wood, found in Wellassa. The native dyers of the Coast of India grind the root, and make an infusion, to which a piece of alum being added, the colour is changed from yellow to red. It is used as a red-dye for cotton cloth. It is the *Ahu-gaha* of the Siṅhalese, and *Nuṇá-maram* of the Tamils. In India it is known by the name of Hal dye.* The Jury of the Great Exhibition have stated that "the colours dyed with the Morinda are for the most part not brilliant, but the colouring matter is far more permanent than many other red colours are, and with improved management would probably rival that of Madder; it would therefore perhaps be a useful dye stuff; it appears well worthy the attention of dyers."

Arnotto.—This is the produce of the *Bixa orellana*. The tree grows wild in and about Badulla, Passara, and Wellassa. The dye may be prepared by a simple and inexpensive process, namely, by steeping the seeds in water, and removing the colouring matter from them. The colouring matter which remains suspended in water is then boiled in large copper vessels to the consistency of syrup.

Terminalia Chebula.—The drupes are collected and taken down to Colombo from various parts of Uva. They are used to dye black, and are called "Gall nuts," or Myrobalans. They are used both in dyeing and tanning, and form one of the exports of the country; with alum it forms a yellow colour, and with the salts of iron black.

* *Vide* "Observations on the Vegetable Products of Ceylon," 1853, p. 14.

It is remarkable that the word *triphala*, commonly used by the Siṅhalese quacks to include decoction of the three Myrobalans, is a Sanskrit word, derived originally from a very ancient work, which according to Professor Wilson was written before the 9th or 10th century. (Royle.) It is stated by the Jury Report of the Madras Exhibition, that Gall nuts "have become a very important article of trade, and the consumption is now fully 2,000 tons annually." (Archer.)

Indigo.—I submitted specimens prepared from the *Indigofera tinctoria* growing wild at Dikwęlla, near the Badulla oya and paddy fields. It is found in groups. I collected a quantity of the plant in July 1855, and subjected it to the keeping process which is generally adopted in Bengal. The plants attain a good height, and from their luxuriant growth shew that the soil and climate of Badulla are well adapted for its cultivation.

I subjoin an extract from a letter, dated 9th October, 1855, from the Secretary of the Chamber of Commerce, Colombo.

"I am requested by the Committee of the Chamber of Commerce to acknowledge your letter of the 25th September, and to thank you for the sample of Indigo forwarded. I am also requested to inform you that the quality of it is good, taking into consideration the circumstances under which it has been prepared."

(Signed) R. NICOL."

FIBRES.

Fibre is the modification of single cells. Fibre from *endogens* is generally white, and contains more lignine or woody matter; hence it is less adapted to resist strain, and possesses less flexibility and softness than that from *exogens*.

The fibres of *endogens* most commonly applied to useful purposes are derived from leaves, as the aloes, agave, yucca or Adam's needle, sanseviera, fourcroya or gigantic aloe, ananas or pine-apple; and from stems, as the musa or plantain; and from the husk of seeds, as the coconut palm; and from the sheath of the leaves of the jaggery palm or kitul, the black horse-hair-like fibre. From the *exogens* we derive many valuable kinds, viz., flax, rhea or China

grass cloth fibre, the *Urtica heterophylla* called vegetable wool, the *Calatropis gigantea* or mudar, *Hibiscus cannabinus*, from which gunny bags are made.

The extraction of fibre during the native rule was one of the services imposed on the Rodiya caste, who had to supply the stores of the King with ropes made of different fibres chiefly of the *Sanseviera* and *Kitul* or jaggery palm.

These people up to this day continue manufacturing fibre ropes, and they are very expert in extracting fibre with the hand, which I ascertained when I employed them for the purpose: but they are indolent and do not seem to care about working regularly.

One of the most remarkable fibres found in the districts is the *Sanseviera Zeylanica*, or bow string hemp. This plant grows in great abundance in the otherwise barren parts stretching towards Batticaloa, and the lower road to Kandy. It has 5, 6, 8, 10, 20, radical leaves, with dark matches or spots across, which disappear when they become old. The young leaves are nearly round, and the old ones are marked with longitudinal lines terminating on an obtuse point. Plants growing near streams yield good strong white fibre, the best kinds being obtained from the young leaves; these generally measure from one to three feet; the longest of those growing at Alipot, reached to four feet and a half.

The natives have recourse to various methods of extracting the fibre, by scraping the leaves, and maceration. To two sticks fixed in the ground a piece of split bamboo with a sharp edge is fastened horizontally at a convenient height for the operator. He begins by scraping the base of the leaf, and twisting the fibre round a piece of stick, with which he holds the leaf firmly, and draws the upper surface towards him; thus scraping the pulp and with it removing much of the short fibre, which will make good tow. The Rodiyas substitute a buffalo's rib for the sharp-edged bamboo, placing

the concave side of the rib towards the operator, and using the same process as that I have already mentioned.

Another method is to scrape the leaf between two sharp pieces of bamboo placed one above the other, leaving a narrow interestice between them, through which the apex or narrow point of the leaf is drawn out. By this method of extracting the fibre the following results are obtained. One of the leaves yields 100 grains of clean fibre, and 70 grains of tow. Half a cwt. of leaves yields ¾ lb. of fibre; cost of collecting leaves 7½*d.*, cleaning 7½d.; ¾ lb. of fibre costs 15*d.*, 1 cwt. costs £9 6*s.* 8*d.* 250 leaves on an average weigh 20 lbs., and 500 yield ½ lb. fibre and ¼ lb. tow; ½ cwt. contains 641 leaves. It may be stated generally, that 1 cwt. of leaves yields 1½ lb. of fibre; 75 lbs. of leaves can be cleaned by one man in a day, yielding 1 lb. of fibre and ½ lb. of tow; 1 lb. of leaves could be cleaned in 10 minutes.

By maceration, 1 lb. of leaves macerated for five days yielded 225 grains of fibre; 1 cwt. yielded 4 lbs. 4 oz. of fibre

The plant grows near Badulla at Ridipána, Donhindayi, Bóliyadda, and at Pisce, where it is found in perfection.

From the above it is scarcely necessary to remark, that the extraction of fibre by hand labour can never be made remunerative.

Horse-hair-like fibre of the Kitul or Jaggery Palm.—Very strong black fibre, like horse-hair, about 3 feet long. It is well adapted for making brushes, and for other purposes, for which horse-hair and bristle are used. I forwarded a brush made of this fibre to the Society in 1853; and I believe this first drew the attention of the merchants at Colombo to the subject, the brush having been shewn by Dr. Lamprey to one of them. Large quantities are now exported to England.

It is found in great abundance in Mędikinda as high up as Haputale. Owing to strong winds which prevail in

Udukinda the trees are blown down, and very few are to be found growing there.

Antiaris Saccidora.—A remarkable forest tree, called in Sinhalese ritigaha. By an ingenious though simple process, the natives prepare from the bark of this tree, material for very strong and elastic sacks for the purpose of carrying paddy, &c. The trees selected for the purpose are from ¾ to 1 foot in diameter. Large ones, sometimes measuring as much as 4½ feet and more in diameter, are not so suitable.

When a tree has been fixed upon, the stem is cut down and divided into junks of the size required, and these having been firmly placed on the ground, the bark is well beaten with a stone or club, until the parenchymatous parts, or what is commonly called the cortical, comes off, leaving the liber or inner bark attached to the wood, which is then entirely separated from it by simply drawing it out with the hand. The bark thus obtained is of a fibrous structure, remarkably tough, presenting the appearance of a woven fabric like that of a stocking.* No scientific description of the tree found in Ceylon was published previous to 1853, although it was well known to the people of Badulla.

New Material for the Manufacture of Paper.—In Eastern countries paper was manufactured from indigenous fibre long before it was introduced into Europe in the eleventh century. According to Col. Sykes, for 2,000 years paper had been made in India; never from rags, but always from fibre. Some years ago I brought to notice the mode adopted by the natives of Badulla for manufacturing paper.

When in 1853 the scarcity of rags in the European markets began to be felt, I commenced my experiments on various indigenous products found in the district of Badulla.†

* *Vide* "Observations on the Vegetable Products of Ceylon," page 20-21.
† *Vide* Journal Asiatic Society, Ceylon, 1855, p. 74-75.

A small factory was set up five miles from Badulla, at Ambagaha oya, where the material was found in abundance, and paper was made by hand labour. I now lay before you a few specimens of the paper mannfactured by me.

After spending nearly £200 I was obliged to abandon the manufacture, owing to the want of suitable machinery for reducing the raw material into pulp. With proper machinery the cost may be greatly reduced; and I believe, that the manufacture of paper with this new material will yield a good return. The pulp is not easily distinguishable from that made of rags; 90 grains made one sheet of paper of the size of foolscap; 12 sheets of paper made with it weighed 2 oz. 2 drs.; 1 ream 100 oz. Again 160 lbs. of the raw material made four reams of paper. Weight of 1 sheet of paper 70 grains; 8 lbs. 6 oz. of pulp are required to make 1 ream. 1 lb. of fresh material yields ¼ lb. of paper pulp.

The specimens of paper manufactured by me were submitted by Government to the Stationery Committee, composed of Mr. Saunders, Captain Higgs, and Major Layard. These gentlemen reported in a letter to the honourable the Colonial Secretary, dated 8th August, 1856, that "the specimens might be rendered applicable to many useful purposes, such as for making envelopes, and printing licences, permits, way bills, &c.; the blotting paper would answer very well."

Mr. Bernard, Deputy Commissary General, in a letter to the Colonial Secretary, dated 25th August, 1857, states "with regard to the quality of the paper it appears to me, that even now they are much better than a great part of the paper manufactured in India, and extensively used in public offices there." I forwarded 1 cwt. of paper-pulp to the Chamber of Commerce, Colombo, on the 19th September, 1855. The Secretary informed me "that the 1 cwt. of the pulp is now

being shipped to London as a trial, and the result of the sale, and the broker's report thereon, shall be forwarded you on receipt." No information of the trial of the pulp in London has yet been communicated to me. The pulp was forwarded by Messrs. Armitage Brothers.

In the Appendix to this paper will be found Correspondence with Government on the subject of the manufacture of paper.

I have also tested the pulp as a substitute for making articles of papier maché.

Cotton is cultivated in Kandapalla, a dry part of the district; and formerly a very coarse kind of cotton cloth was manufactured there.

Animal Products.

Lac is found in the *Gyrocarpus Jacquini*, and the people of Bintenne collect it from June to September; it is of good quality. The lac yields to boiling water a red dye, and with solution of alum strikes a beautiful carmine.

It is the produce of the *Chermes Lacca*. Lacker painting is carried on in Wadakonna, and much of the lac is used for this purpose. Walking sticks, handles for knives, and bows, are beautifully lackered.

This also was a "*Rájakáriya*" in the district. A good deal of lac is obtained from Kandapalla where it is gathered in July.

Minerals.

Lime-stone abounds very extensively throughout the district. During the native rule, lime was largely prepared at a place called Háṇgiliella on the Nuwara Eliya road; its preparation being one of the compulsory duties imposed on the people.

Digging for Precious Stones.

This was also made one of the compulsory duties called "Agery," and the work was carried on at Nuwara Eliya in the following localities:—Vilmána, Lindaoluva, Bagawantaláwa, Sítá Eliya, Bópatalava, Mahá Eliya, Udavilmána,

Mápillamána, Madwalamulla, Palalmána, and Patara-galdóva.

Iron Ore.

There is abundance of iron ore in the following places :— Tolabówatta, Uḍawádiya (near Nahaville,) Hílpeṇkandura, Vaha Eliya in Kandapalla, Horagóna also in Kandapalla, Hattawalla in Bógoḍa.

The place where iron was smelted for the King of Kandy was at Kínagandóva in Tolabowatta, and it was made a compulsory labour performed by the people of Kandapalla and Sabaragamuwa.* Magnetic iron ore is found at Kahaṭavela, near Paranagama, Yaṭakohilla, and on the road to Kataragama.

Sulphuret of Iron, from Binṭenna, is composed of arsenic in a greater quantity than sulphur. Large masses of this substance are found in various parts of the low country. In passing along some of them, the attention is arrested by the not very pelasant odour of sulphureted hydrogen gas evolved by them.

It is the general belief of the people that sulphur ore exists in Walapana and Binṭenna. I obtained a specimen of this ore from a Kandyan at Gampaha, but I have not been able to ascertain the locality from whence it was obtained. The preparation of sulphur was one of the compulsory duties which was rendered by the family of Ṭennegedara at Teripeḥe in Walapana.

Corundum, or Cinnamon Stone.

This abounds in a place called Batgamaná, which is situated 12 miles from Alipot. The mineral is found in a stream called the *Agáre-kandura*. The natives prepare a useful hone by a composition of the powder of this mineral with lac : they melt the lac, and gradually add the powder, which when cooled becomes hard, and is shaped into different sizes.

* For a description of the mode of manufacturing steel as adopted by the Siṅhalese, *vide* Journal of the Asiatic Society of Ceylon, 1855, p. 73.

Iron alum, found as an efflorescence on a decomposing rock of gneiss called *pudama* near Teldeṇiya. The specimen contains more iron than alum.

Plumbago abounds in Bintẹnna.

NITRE EARTH.

There are numbers of nitriferous caverns in this district composed of large limestone rocks with subterranean passages, and containing heaps of mould-like earth emitting a strong ammoniacal odour. These heaps are the products of the dung of myriads of bats that have inhabited there from ages. By the action of the carbonate of lime in the limestone on the dung thus deposited, there results the well-known chemical compound of nitrate of lime such as is obtained from the artificial nitre beds of Europe. The Siṇhalese, who call the earth *vavul pas*, "bats earth," have a mode of converting it into saltpetre not altogether dissimilar to the mode adopted in Europe at the present day, by which the nitrate of lime is converted, by means of ashes, into the nitrate of potash or saltpetre.

The manufacture of saltpetre was one of the compulsory labours imposed on the people of the district, and called *Lunu-rájakáriya* which began in the month of June or July. The people of Lunu-gala, a village about four miles from Badulla, proceeded to a cave at Gampaha in Kandapalla kóralé and constructed sheds for the manufacture, they were assisted by others who furnished them with torches and oil for working in the dark caves.

The manufacturers of the nitre belonged to a caste called *Vahumpurayó*, who collected nitre earth and firewood; four or five *gamarálas* supplied them with a quantity of kakune or kene oil, a dhoby furnished torches made of cloth and the dried spath of the coconut, and potters of Tunkinde supplied pots for carrying on the manufacture.

The following is the process adopted, which is exceedingly simple and inexpensive. They take a quantity of nitre

earth and mix it up with wood-ashes of the *Erythrina Indica* and *Terminalia* alata, or the petiole of the coconut; putting the whole into a large talipot leaf previously shaped into the form of a funnel; they then proceed to pour water over and filter this mixture of earth and ashes. This operation is continued until the water begins to look turbid, when it must at once cease, as this is an indication of the purely earthy character of the particles yet remaining in the leaf. The washing obtained in the way above described is generallv very clean, possessing a strong ammoniacal odour, and containing nitrate of potash in solution. To crystallize this, they remove the washing into a large chatty in which it is boiled till it thickens and presents the appearance of "a mixture of flour and water;" in this state it is transferred to another earthen chatty having a rough surface within, called *koraha*, where it is left until crystallization takes place. But as the crystals thus formed do not look white and nice, they are dissolved once more in water, and allowed to crystallize again, when fine large crystals are produced. The saltpetre obtained in this way was used by the Kandyans chiefly for making fireworks; indeed the native term for it, *vediluṇu* would indicate this much. Great attention appears to have been paid by the Sinhalese to the Pyrotechnic art, on which they have numerous and elaborate compositions. The Chinese it is well-known have always been famous for their fireworks, which are superior to those of other nations in variety and beauty. They likewise used saltpetre for this purpose before they became acquainted with the art of making gunpowder.

Dr. Davy's early scientific researches in Ceylon ought to be more generally known than they have been among the residents and others who are engaged in similar researches. The learned Doctor travelled through the length and breadth of the Island; he had excellent opportunities for making personal observations, and his descriptions of

every thing he saw, examined, and described, are generally correct, even to this day. I quote from his valuable "Account of the Interior of Ceylon" published in 1821, respecting the Nitre Caves of Ceylon:—

"Nitre and Nitrat of lime are of frequent occurrence. The names of twenty-two places may be enumerated, in which saltpetre is produced, and in which it has been manufactured; and no doubt, besides these, there are many other spots that yield this salt, known to the natives, whose policy it is not to make us acquainted with them. Judging from four nitre caves that I have visited, and from the specimens of rocks of several more that I have examined, I believe that they are all very similar; and that the rock in which they occur, in every instance contains at least felspar and carbonate of lime; from the decomposition of the former of which, the alkaline base of the salt is generally derived, and by the peculiar influence of the latter, (yet not at all understood,) on the oxygen and azote of the atmosphere, the acid principal is generated. In confirmation of this statement, it may be remarked, that I have never been able to detect saltpetre, excepting superficially, where air could have access; never unaccompanied by nitrat of lime, or magnesia; in no rock, not containing lime and felspar; that the richness of the rock, in general, has been proportional to the abundance and intimate mixture of these two ingredients; and that the results of experiments which I have made on a variety of specimens of saltpetre-earth from Bengal, for which I am indebted to the kindness of Mr. Brown of Calcutta, were similar to those just mentioned, and tended to the same conclusions.

"Besides the essential circumstances of the presence of atmospheric air, lime, and an alkaline mineral, there are other circumstances which, if my observations be correct, greatly aid in the operation of forming the salt. I shall mention the most remarkable only, which appear to me to be slight humidity and the presence of a little animal matter. Perhaps, humidity is absolutely necessary; certainly, I have seen spots in a nitre cave, without any impregnation of saltpetre, which, excepting their great dryness, seemed to possess every requisite for the production of the salt. Animal matter, by those ignorant of chemistry, is considered of itself the chief source of nitre. Persuaded of this, my countrymen in Ceylon, with whom I conversed on the subject, generally attributed the saltpetre of the caves in question to the dung of bats, with which the caves are more or less infested. It is easy to refute such a notion; and to

shew, that the dung of these animals, like any animal matter, is not an essential, merely an assistant circumstance. For this purpose, it will be sufficient to remark, that in the nitre cave near Memoora in Doombera, in a very compounded rock consisting of calcspar, felspar, quartz, mica, and talc, in a humid state exposed to the air, and slowly decomposing, I have found a rich impregnation of saltpetre, though quite free from the dung of bats, or any other animal matter; and conversely, that I have not been able to detect any traces of this salt in the dung of bats, that had accumulated in great quantity in an old forsaken pagodah.

"A description of the nitre caves which I have visited, will be found in another part of this work, and an account of the method employed by the natives, both in the manufacture of saltpetre and of gunpowder. I may here give the results of some analyses, that I have made, which will shew the composition, of the most productive nitre rock of Doombera, of the most productive nitre earth of Ouva, and of the richest nitre earth of Bengal. The nitre rock of Doombera was from the Memoora cave, the same as that before mentioned as free from animal matter; 100 parts of this very compounded rock were found to consist of—

2·4 nitrat of potash.
0·7 nitrat of magnesia.
0·2 sulphat of magnesia.
9·4 water.
26·5 carbonat of lime.
60·7 earthy matter, insoluble in dilute nitric acid.

100·0

100 parts of the nitre earth, from the great cave in lower Ouva, near Wellaway, were found to consist of—

3·3 nitrat of potash, with traces of common salt and sulphat of lime.
3·5 nitrat of lime.
15·3 water.
25·7 animal matter of difficult solubility.
1·0 animal matter easily soluble in water.
51·2 carbonat of lime and earthy matter.

100·0

100 parts of nitre earth from Bengal, from the district of Tirhoot, were found to consist of—

8·3 nitrat of potash.
3·7 nitrat of lime.
0·8 sulphat of lime, with a trace of iron.
0·2 common salt.
35·0 carbonat of lime, with trace of magnesia.
40·0 earthy matter, insoluble in water and nitric acid.
12·0 water, with a trace of vegetable matter.

100·0

"Nitrat of lime I have never met with, excepting in combination with nitre. Sulphat of magnesia I have found in one place only, viz., the nitre cave of Memoora in Doombera. In the same cave, and no where else, I discovered alum, in minute quantity. I suspect that the acid of both these salts is derived from decomposing of pyrites, and that the magnesia of the sulphat is afforded by decomposing talc. This sulphat forms with the nitre, and crystallizes with it. It is carefully picked out and rejected by the native workmen who prepare the saltpetre, being ignorant of its value. A considerable quantity of it, equal to the best Epsom salt, might be procured in this cave, and I know no reason why it should not be collected."*

Appendix.

Badulla, 19th July, 1856.

Sir,—I beg leave to submit for the consideration of Government, that I have been since the year 1853 experimenting upon various indigenous vegetable products with the object of finding a material adapted for the manufacture of paper, and which could be obtained in quantity and at a cheap cost. And I am now able to say that I have succeeded in manufacturing the accompanying specimens of paper from a shrub which grows plentifully in the district of Úva. This paper it may be observed possesses the property of combining less weight with greater tenacity than that made of rags, and is peculiarly suited for a tropical climate.

2. With the very rude machinery I have at present, I am prepared to manufacture four or five reams per diem by a process similar to that adopted in England for making paper by hand.

Common foolscap is the largest size that can be made at present, and the rate at which such paper could be supplied would probably be less than the rate at which similar paper is usually procurable by Government.

3. A small Factory has been set up near Badulla, and the work carried on by a friend of mine who lives on the spot; and if the present rough paper is adapted for any public purposes, arrangements could be made to meet the demand. And with the aid of Government in the shape of a regular demand for such description of paper, I should hope to be able to produce paper of a superior quality by means of better machinery.

4. It may perhaps be considered premature to bring forward this matter at its present stage to the notice of Government, but as I have already laid out a considerable sum of money in experiments, and it not being in my power to continue them, I now respectfully

* Davy, pp.

solicit the aid of Government in the manner about indicated; feeling assured that such an humble attempt in developing the resources of the country will meet with the fostering protection of the Government whom I serve.

I have, &c.,
(Signed) W. C. ONDAATJE.

To the Hon'ble the Colonial Secretary.

Colonial Secretary's Office,
Colombo, 13th August, 1856.

SIR,—Referring to your letter of the 19th ultimo, I am directed to transmit to you copy of one from the Committee on Stationery.

I have, &c.,
(Signed) P. W. BRAYBROOKE.

Mr. W. C. ONDAATJE, Badulla.

Stationery Committee,
Colombo, 18th August, 1856.

SIR,—In reply to your letter of the 31st ultimo, forwarding for report one from Mr. W. C. Ondaatje, accompanied by specimens of paper made by him in Úva, we have the honor to state that in our opinion, the successful results which have attended Mr. Ondaatje's praiseworthy efforts to manufacture paper in this Island, are most creditable to him and deserving of every encouragement.

Of the specimens herewith returned those marked No. 1, 2, and 3 might be rendered applicable to many useful purposes, such as, for making envelopes and printing licenses, permits, way-bills, &c., while No. 4. would answer very well as blotting paper, and might probably be improved if made a little thicker.

In order however to ascertain whether this paper is likely to supersede the use of that at present applied to the purposes named, it will be necessary for Mr. Ondaatje to state the cost at which he can undertake to deliever it. We would further recommend that with this information a ream of the best description cut to size and of uniform colour, also, a ream of the blotting paper, be sent to the Commissariat Department that a fair trial may be made with it, and its utility more fully reported on.

We have, &c.,
(Signed) F. SAUNDERS,
,, JOSEPH HIGGS,
,, W. T. LAYARD.

(True Copy.)
(Signed) P. W. BRAYBROOKE.

To the Hon'ble the Colonial Secretary.

Assistant Govt. Agent's Office,

Badulla, 31st January, 1857.

SIR,—I have the honor to enclose specimens of paper manufactured by Mr. Medical Sub-Assistant Ondaatje.

2. His very praiseworthy exertions have been unceasing during the last three years. Considering that he has worked alone and against many disadvantages, there can be no doubt that his success has been very great. He has expended a large sum of money, near £200, in testing his experiments, and is on the point of giving up any further prosecution of them, in consequence of the want of machinery for reducing the fibre into fine pulp, the present manual labour for that purpose so greatly increasing the cost of the material as to preclude its competing, as an article of commerce, with other inferior fibres.

3. Though he is obliged for the present to abandon all thoughts of exporting the fibre to England, he is able to manufacture the paper, of which I enclose you specimens, in some quantity, and at very reasonable rates.

4. The headmen in all districts are now required to send returns, &c., which it is impossible they can do on olas: yet no paper is allowed them, and they are obliged to purchase it at their own cost.

Paper No. 1 and 2, 2½ reams a month.
Blotting paper, 30 reams a month.
No. 1 paper:
In Colombo *6s. 6d* per ream.
In Kandy *7s.* 6d. per ream.
In Badulla 5*s.* per ream.
No. 2 paper:
In Colombo 5*s.* per ream.
In Kandy 4*s.* 6*d* per ream.
In Badulla 4*s.* per ream.

5. The paper marked No. 1 and 2 can be supplied by Mr. Ondaatje, in the quantities and at the prices mentioned in the margin, much cheaper rates than lumberhand, (than which it is scarcely inferior in texture and to which it is superior in toughness,) is furnished to Government; which I believe is 7*s.* 6*d.* per ream. He could also manufacture paper of demy size.

6. There can be no question, I think, that it is not right to call on headmen to make returns which require paper, and not to supply them with paper for the purpose. I have the honor to suggest, therefore, that you should, if you concur with me in my views on this subject, recommend to Government that Mr. Ondaatje be employed to supply paper for this purpose; for superseding the use of olas in the Kachcheries generally, and for any other use to which his paper can be put. Either description of paper would answer excellently for forms, vouchers, returns of births, deaths, population lists, and division officers' books; and the blotting paper (of which I enclose

Blotting paper.
In Colombo 8s.
In Kandy 7s. 6d.
In Badulla 7s. 6d.
N.B.—Blotting paper is supplied to Government at 13s. 6d., I believe.

a specimen,) I prefer to that supplied by Government, and it possesses the additional recommendation of being very much cheaper, as the note in the margin will shew you. Were it a little thicker it would be perfect.

7. I feel sure that His Excellency the Governor will be inclined to look favourably on Mr. Ondaatje's praiseworthy exertions, supported, as I hope they will be by your recommendation, and I trust that he will, if possible, be encouraged in his efforts to develop the resources of the district; since from the results of his experiments, there is every reason to believe the Colony will really benefit by his prosecution of them.

I have &c.,
(Signed) J. BAILEY,
A. G. A.

To the Government Agent, Kandy.

Government Agent's Office,
Kandy, 26th *March*, 1857.

SIR,—With reference to your letter No. 23 of the 31st January last, relative to the paper manufactured by Mr. Medical Sub-Assistant Ondaatje, and enclosing specimens thereof, I have the honor to annex for your information copy of a letter addressed by me to the Honorable the Colonial Secretary on the subject.

I have, &c.,
(Signed) W. D. WRIGHT,
for Agent.

To the Assistant Govt. Agent, Badulla.

Government Agent's Office,
Kandy, March, 1857.

SIR,—I have the honor to annex copy of a letter No. 23, of the 31st January last, from my Assistant at Badulla, relative to the paper manufactued by Mr. Medical Sub-Assistant Ondaatje, enclosing specimens thereof, which I also beg to enclose.

2. Since they were received by me, I have had the quality of the paper marked No. 1 tested, and it will be seen that it receives printing and writing inks equally well.

3. Were I in a position to show that the paper now forwarded is cheaper than what is at present supplied to Government, for use in the public offices in the Central Province, I would be happy to support Mr. Bailey's suggestion, that Mr. Ondaatjie be requested to supply the paper as required. But I fear that such is not the case,

nor is it likely to be so, while Mr Ondaatje's machinery for reducing the fibre into pulp continues to be so defective.

4. I can therefore only submit these papers to the Governor, with the expression of my hope, that His Excellency will be able to obtain for Mr. Ondaatje, the active co-operation of other parties, in his praiseworthy attempts to develop, what may ultimately prove to be, a valuable Island manufacture.

I have, &c.,

(Signed) E. RAWDON POWER.

[True Copy.] *Agent.*

To the Hon'ble the Colonial Secretary.

Assistant Government Agent's Office.

SIR,—With reference to the 3rd paragraph of the letter to the Colonial Secretary, copy of which was annexed to your letter No. 581 of the 26th ultimo, I have the honor to invite your attention to the 5th paragraph of my letter of the 31st January, No. 23.

2. In that letter I shew that Mr. Ondaatje professes himself ready to supply paper scarcely inferior to lumberhand, and excellent blotting paper, at prices considerably lower than paper of similar description is supplied to Government, and I now annex a Statement shewing in a tabular form the particulars of his offer.

3. I venture to suggest for the consideration of Government, whether it would not be worth while to give Mr. Ondaatje an opportunity of proving the value of his discovery, by permitting him to supply paper to the Kandy and Badulla Kachcheries, to a limited extent, provided he can give good security for the fulfilment of his engagement.

I have, &c.,

(Signed) J. BAILEY.

To the Government Agent, Kandy.

Statement referred to—

Description of Paper.	By whom supplied.	Cost per Ream.			Savings per ream to Govt. on No. 1 paper & blotting paper, if supplied by Mr. Ondaatje.		
		Colombo.	Kandy.	Badulla.	Colombo.	Kandy.	Badulla.
		s. d.	*s. d.*	*s. d.*			
Lumberhand...	Commissariat	7 6					
Blotting paper	Do.	13 4					
Paper No. 1...	Mr. Ondaatje	6 6	5 6	5 0			
Do. ,, 2...	Do.						
Blotting paper	Do.						

Diwitotewelle, 27th March, 1857.

DEAR SIR,—I have directed that a copy of the letter which Mr. Power addressed to Government, respecting your paper, should be sent you. This is in reference to the letter which I wrote some time before the Governor came to Badulla. I can't help thinking Mr. Power is under some mistake, and that your paper *is* cheaper than the lumberhand, and blotting paper supplied by Government. Please send me again (for I have left my memorandum in Badulla,) the prices of your and Government paper.

The Governor shewed me a letter he had written to the Under-Secretary of State, transmitting specimens of your paper and pulp, and strongly recommending your invention to his notice.

I have, &c.,
(Signed) J. BAILEY,
A. G. A.

W. C. ONDAATJIE, Esq., Badulla.

Assistant Govt. Agent's Office,
Badulla, 5th June, 1857.

SIR,—With reference to former correspondence, I have the honor to annex for your information, copy of a letter No. 207, dated the 2nd instant, from the Government Agent, Kandy, to my address.

I have, &c.,
(Signed) J. BAILEY,
A. G. A.

W. C. ONDAATJIE, Esq., Badulla.

No. 207. *Government Agent's Office,*
Kandy, 2nd June, 1857.

SIR,—With reference to your letter No. 112, of the 7th April last, relative to the paper manufactured by Mr. Medical Sub-Assistant Ondaatjie, I have the honor to inform you, that I have submitted the whole Correspondence to Government, with a suggestion that the Deputy Commissary General be requested to report upon the subject.

I have, &c.,
(Signed) E. RAWDON POWER,
Agent.

The Assistant Govt. Agent, Badulla

No. 413. *Government Agent's Office,*
Kandy, 12th September, 1857.

SIR,—I have the honor to forward copy of a letter No. 422, of the 3rd instant, from the Honorable the Colonial Secretary, and of the enclosure

therein referred to, on the subject of the paper manufactured by Mr. Ondaatjie, and to request that you will be so good as to communicate the same to him.

I have, &c.,
(Signed) W. D. WRIGHT,
for Agent.

The Assistant Govt. Agent, Badulla.

No. 422. *Colonial Secretary's Office, Colombo, 3rd September, 1857.*

SIR,—With reference to your letter No. 141, of the 26th March last, I am directed to transmit to you a letter received from the Deputy Commissary General, on the subject of the paper manufactured by Mr. Ondaatjie, and to request that the same may be communicated to him. That officer has been instructed to pay Mr. Ondaatjie for the paper supplied by him.

I have, &c.,
(Signed) C. J. MACCARTHY.

The Govt. Agent, Kandy.

No. 207. *Deputy Commissary General's Office, Colombo, 25th August, 1857.*

SIR,—The Correspondence herewith returned from the Government Agent at Kandy, and his Assistant at Badulla, respecting the specimens of paper manufactured by Mr. Ondaatjie, was referred to me with your letter of the 5th June last, and I should have replied to it sooner, but that I waited to be able to examine the paper lately received from England, and in the hope that the Invoice shewing the latest prices of paper would have arrived; but it has not yet reached me.

2. It appears to me that there are three distinct questions raised in the Correspondence.

1st.—The substitution to a certain "extent" (a difficult term to define) of Mr. Ondaatjie's papers for the commoner descriptions of paper, such as Lumberhand, Common Foolscap, and Blotting Paper, which are now imported from England.

2nd.—The proposal to issue free of payment Mr. Ondaatjie's paper to headmen in the districts for returns, or other documents for which either *olas* are now used, or for which they are not allowed stationery.

3rd.—The comparative price between Mr. Ondaatjie's paper and imported paper.

3. It appears to me that the specimens of paper forwarded with the Government Agent's letter of 26th March last, (No. 1, here-

with returned) are not equal in quality to the specimens forwarded in November last, just before I returned from England. Some of these latter specimens (No. 2) are herewith enclosed.

I have also put together some specimens of English and other imported paper, with the prices marked (No. 3).

4. With regard to the quality of Mr. Ondaatjie's papers, it appears to me that even now they are much better than a great part of the paper manufactured in India, and extensively used in public offices there. I would however offer the remark that as Mr. Ondaatje has made so much progress towards complete success in the manufacture of common paper, he might possibly with improved machinery be able to extend that improvement, by making the paper thinner and lighter. At present, it weighs rather more than half as much again as English paper of the same description and size. If the thickness and weight were reduced, I think it might become serviceable paper.

5. With regard to the second point, if His Excellency the Governor should deem it right, that stationery should be issued to the headmen for their returns, &c,, doubtless, Mr. Ondaatjie's paper would answer the purpose exceedingly well. I was under the impression that one of the reasons given by Mr. Buller, the former Government Agent, for his large demand for stationery, was, that the numerous returns required to be furnished by the headmen required that stationery should be issued to them.

6. Lastly, with regard to comparative price, I should for the present exclude Colombo from consideration, but if Mr. Ondaatjie can supply paper equal, or rather superior, to the best of the specimens of common paper furnished by him, at 5*s.* a ream at Badulla, and at 5*s.* 6*d.* a ream at Kandy, and if he could also supply blotting paper made of the full size of the English blotting paper at a price increased in proportion to the increase of size, (taking his present specimen as worth 7*s.* at Badulla, and 7*s.* 6*d.* at Kandy), I strongly recommended that some of it should be supplied for the use of the Government Agent at Kandy, and of his Assistant at Badulla.

7. The envelopes I do not at present consider necessary, as half a sheet of paper answers the purpose quite as well and can be used twice, which is not the case with envelopes, added to which 2*s.* 6*d.* per 100 is too dear for them, as they can be made here for the Colonial Secretary's Office at 2*s.* a hundred.

8. In conclusion, I would beg to suggest that Mr. Ondaatjie be invted to endeavour to submit specimens of paper of a thinner

description for writing, but of the same size as those submitted last year, and also blotting of the size of the sheet of English blotting paper enclosed. If the new specimens be approved of, probably His Excellency might be disposed to allow the paper to be used by way of experiment in some of the public offices at Badulla and Kandy, in order to obtain the opinion of public officers there as to the prospect of their being able to use it with advantage.

9. Having received altogether about 29 quires of the Common Foolscap paper, and about 13 quires of Blotting paper, prepared by Mr. Ondaatjie and sent down here as specimens, I would suggest that he should now be paid for this experimental paper, at the rate proposed by him, namely, 6*s*. 6*d*. a ream for the former paper and 8*s*. for the latter; and I may probably be able to use up this quantity of it in my own department.

I have, &c,
(Signed) W. D. BERNARD,
D. C. G.

THE DIFFERENCE BETWEEN THE PALI AND THE PRAKRIT-MAGADHI OF VARARUCHI.

BY JAMES D'ALWIS, ESQ., *Assistant Secretary.*

PALI is the name given in Ceylon, and some countries in western Asia, for the dialect of the Buddhist Scriptures, which was cultivated in the kingdom of *Mágadha*, or modern Behar, about the 6th century before the Christian era. The Siṇhalese, like the Burmese, use both *Páli* and *Mágadhì* to express their sacred language; whilst Indian Grammarians designate one of the dramatic dialects, the *Màgadhì*, and also identify it with the language of *Mágadha*.* Although, therefore, the *Páli* and the *Mágadhì* are names for one and the same dialect; yet the language defined by Pràkrit Grammarians as *Mágadhì* is essentially different from the *Mágadhì* or *Páli* of Ceylon, which, from the time it was banished from the country whence it derived its name, remains fixed as a dead language in this Island, unaffected by those changes which as a spoken language it has undergone in its migrations in India,—assuming at one time the style (as in the Nepál Scriptures) of an "indescribable milange in which incorrect Sanskrit bristles with forms of which some are entirely Páli and others popular"; † at another, the form of the Pillar dialect of Aṣóka's reign; and at last, the *Màgadhì* of the *Jains*.

These differences establish many important facts in the history of Asiatic languages; and moreover, unsettle the

* See Cowell's Pràkrit Prakàsa, p. 179, *et seq.*
† L'Histoire du Buddhisme Indien, by M. Burnouf, p. 105.

opinion generally received at the present day, as to the age of the dramatic literature, and of Vararuchi, whom some have erroneously regarded as identical with *Kàtyàyana*.*

To such important questions, however, it is imposible to do justice within the confined limits of periodical literature. The object, therefore, of the following observations is, simply to shew the difference between the *Páli*, otherwise called *Mágadhì*; and the so-called *Mágadhì* of the Pràkrit Grammarians.

Vararuchi, in his *Pràkrit Prakàsa*, which has been translated into English by Dr. Cowell, devotes a Chapter containing 15 Sections, to exhibit the differences between the *Màgadhì* and the *Sanskrit*; and the following observations are confined to comparisons between those laws and the distinguishing characteristics of the Páli.

1. The first rule of Vararuchi is SHASOH SAH. In the Páli there is no *s*: it has only the dental sibilants. The inapplicability of the rule, which states that in the peculiar dialect of Pràkrit termed Màgadhì, 's is substituted for *sh* or *s*' is therefore self-evident.

2. JO YAH. The occasional substitution of *y* for *j* is no more a peculiarity of the Páli than of the Sanskrit or Siṇhalese; *e.g.*, *yamini* or *jamini* in Sanskrit; *yàma* or *jàma*, Siṇhalese 'night.' The usual Páli *nija* is written in the Suttas with a *y*, as *niyan puttan* 'own son.' Instances like these, are exceptions, not the rule, in those two languages. But neither in the instance given by Vararuchi, nor in the great majority of Sanskrit words with a *j*, is it changed into a *y* in the Páli. The reverse of what is given by Vararuchi may be regarded as the rule. Thus, *jàyate* 'he is born,' is the same in the Pali, and is not changed into *yàyade*. So likewise *ràja* is *ràja*, and not *ràya*, 'king;' *gaja* is *gaja* but not *gaya*, 'elephant'; *vajra* is *vajira*, but not *vayara*, diamond.' It is true that in words like *paryùshana* the

* Cowell's Pràkrit Prakàsa, p. vii.

Pali form is *payyùshana*, and not *pajjausana*, as in the common Pràkrit. This peculiarity in the Pali, however, does not indicate a change from *j* to *y*, but from *r* to *y*; the reason of which will be found noticed elsewhere.

3. The next rule, CHAVARGASYAS PṚISHTATA TATHOCH ARANAH, seems to refer to a nicety in the pronunciation of the palatal letters, which we do not perceive in the Páli; and therefore proceed to the

4. HṚIDAYASYA HADAKKAH. This is equally inapplicable to the Páli. *Hṛidaya*, 'heart' never becomes *hadakka*, but *hadaya* in Páli; so likewise *hrasva*, 'short,' is not *hadàsva* but *rassa*; *hrí*, 'shame,' is not *hida* but *hirí*.

5. RYARJAYOR YYAH. The substitution here spoken of *yy* for *ry* and *rj* may be regarded as the exception (and that of very rare occurrence) rather than the rule in the Páli. Thus *kàryam*, 'to be done,' is not *kayye* but *kariyan*; and *durjana*, 'wicked,' is not *duyyana* but *dujjana* in the Páli. So again, *virya*, 'exertion,' becomes *viriya*; *bhàrya*, *bhariya*, 'wife': *aiṣwarya*, *issariya* 'prosperity,' *dhairya*, *dheriya* 'exertion'; and also *garjana* becomes *gajjana*, 'noise.'

6. KSHASYA SKAH. This is again different in the Páli. Thus *ràkshasah*, 'demon,' does not become *laskose* but *rakkhasò*; nor *dakshah*, 'clever,' *daske*, but *dakkhò*. So likewise *vṛiksha*, 'tree,' becomes *rukkha* in the Páli; *kshamà*, *kamà*, 'forgiveness'; *dakshiṇa*, *dakkhiṇa*, 'south'; *kshura*, *khùra*, 'razor' *kshetra*, *khetta* 'field.' This peculiarity will be found explained in another part of our observations.*

7. ASMADAS SAU HAKE HAGE AHAKE. The Sanskrit *ahaṇ baṇàmi*, 'I speak,' is the same in the Páli; and does not become, as stated here *hake*, *hage*, or *ahake*, *banàmi*.

8. ATA IDETAU LUKCHA. The Sanskrit *etad* (root) *eshah* (nom:) is said to be changed in the Màgadhí into *esa*, and *su* being added to it=*èsa su*; and the latter affix being elided, the *a* in *esà* is changed into *i* or *e*. This is not a peculiarity

* *Vide infra*. § 10.

of the *Páli* in which *èta* (root) *èsù* (nom :) becomes *èsò ràjò*, (*esha ràjà* Sank.,) 'this king,' and not as in the Pràkrit Màgadhì *èsi làà* ; and *esha purushah* Sanskrit, becomes *esò purisò* in the Páli, but not as in the Pràkrit Màgadhì *esà pulise*, 'this man.'

9. KTANTAD USCHA : which is rendered by Dr. Cowell into English as follows :—*u* is substituted when the affix *su* follows a word ending with the affix *kta* ; and also (as we infer from the *oha* of the Suttas) we may optionally use the *i* or *e* of the preceding Suttas, or even elide the affix ; as *hasidu* or *hasidi*, *haside hasida*, for *hasitah*, 'smiling.' It is only sufficient to state here that the Páli knows no such thing, and that the Sanskrit *hasitah* is in the former simply changed into *hasito*.

10. NASO HO VA DIRGHATWAMCHA. That is to say *ha* is optionally substituted for *nàs*, the affix of the genitive singular, and at the same time the preceding vowel is lengthened, as *pulisàha* or *pulisàssa dhane* for *purushasya dhanam*. 'the man's wealth.' The Páli form of this is *purisassa dhanam*, wherein the Sanskrit inflexion *sya* is changed to *ssa*, for the simple reason that the Páli dislikes the union of two consonants of different classes. It is further remarkable here that *dhane* of the Pràkrit-*Màgadhí* is *dhanam* (neuter) both in the Sanskrit and Páli, in which, moreover, the cerebral *n* is not used.

11. ADIRGHAS SAMBUDDHAU. It is to be inferred from the examples given under this rule, that in the Pràkrit-Màgadhì dialect, the vocative inflexion *a* both in the singular and plural number is long. In the Páli, however, the termination of the vocative *singular* may be either long or short, as *purisa àgachchha* or *purisà àgachchha*, 'O ! man come.'*

12. CHITTHASYA CHISHTHAH. In shewing the difference of the Páli from the Pràkrit-Màgadhì, it is here sufficient simply to exhibit the Páli forms of the given examples.

* See Clough's Bàlávatàra. p. 19.

1. Purushah tishṭhati.* *Sanskrit*
2. Puriso titṭhati. *Páli*
3. Pulisè chishthadi. *Mag : Prakr.*

13. KRINMRINGAMAM KTASYA DAH. Here again we cannot exhibit the difference of the Páli from the Màgadhì Pràkrit, better than by placing the given examples in juxtaposition with their Páli forms.

Sanskrit *kṛitah*, 'done'	*mṛitah*, 'dead'	*gatah*, 'gone.'	
Pali	*katò*	*matò*	*gatò.*
Prak-M :	*kadè*	*madè*	*gadè.*

14. KTWO DANIH. The following comparative view of the examples given under this rule, shows the relationship of the Páli to the Sanskrit to be far nearer than that of the Pràkrit-Màgadhì.

Sanskrit,	*shadvà gatch*	*kṛitvà gatah*
Pali,	*sahitvà gato*	*katvà gatò*
Prak-M.	*sahidàni gade*	*karidàni àade.*

15. SṚIGALASYA SIALASIALESIALAKAH, the difference between the Sanskrit *sṛigàlah*, and the Pali *sigalo* is simply that occasioned by the absence of the Sanskrit *ri* in the latter language. But Vararuchi gives the three following forms into which that word is changed in the Màgadhì-Pràkrit, *siàlà siàlè siàlàkè.*

* 'The man stands.'

ON HEALTH AND DIET, WITH ESPECIAL REFERENCE TO CHILDREN AND YOUTHS, IN CEYLON.

By Barcroft Boake, B.A., *Vice-President, Asiatic Society, Ceylon.*

None who have had any opportunities of acquainting themselves with the past and present state of Ceylon, and who have taken any pains to avail themselves of those opportunities, can have failed to observe that the character of the climate has materially improved, as regards its effects upon the health and longevity of Europeans resident in the Island.

In former days, Trincomalee was regarded as so pestilential that it was the custom of Insurance Offices to make a special exception with reference to it stipulating that the policies which they issued were not to hold good if the person insured took up his residence there. It is not many years, indeed, since a gentleman who was making a voyage round the Island, felt himself compelled to remain on board during the whole time that the vessel in which he was a passenger remained in that port, fearing lest, by landing there he should vitiate the insurances which he had effected to a considerable amount upon his life. Many persons now prefer the climate of Trincomalee to that of Colombo.

In like manner, the road between this and Kandy was known to be very dangerous to any travellers who passed over it otherwise than rapidly and during the bright hours of the day. There are sundry grave-stones which stand close to

each other in the Galle Face Burying Ground, which are said to be the melancholy record of the effects of the march of a single Regiment from Kandy to Colombo. The loss of human life in the construction of that road, is said to have been something fearful, and that, not only amongst the native labourers, but also amongst the European officers under whom they worked. Even within the last twenty years it was commonly stated that the Resthouse-keeper at Ambépussa was obliged to keep up a double set of servants, as one-half were always sure to be laid up with fever. That road does not now bear so bad a character; and the town of Kandy itself is also believed to have improved very much in salubrity, since it came into the possession of the English.

Much of this improvement is no doubt attributable to alterations which have taken place in the physical features of the country. Forests have been felled, swamps drained, and the observance of some sanitary regulations enforced upon the native inhabitants.

Something, too, perhaps not a little, is due to improved habits of life on the part of the European residents. The few who have been long enough in the Island to remember the state of things which has now, thank God, passed away, and is in great measure forgotten, have strange tales to tell of the excesses which were then committed by men filling positions, the present occupants of which, if their own better principles did not (as they doubtless would) prevent them from imitating the bad example of their predecessors, would be driven from office and from society by the force of public opinion.

The day is gone by when the Officers on the Staff of the Governor and Commander-in-Chief—appointments which in those days were always combined—would think it consistent with their position to endeavour, when invited, in attendance upon the Governor, to dine with an ecclesiastical dignitary to entrap their host into drinking to excess; or

when, supposing that any persons could be found so lost to right feeling as to make such an attempt, their host would feel it necessary to have recourse to an artifice, in order to preserve sobriety which became him as a clergyman, without being guilty of what would be regarded as inhospitality towards his guests. The state of things of which such anecdotes are indicative has passed away, never, it is to be hoped, to return, and, as a consequence of its departure, liver complaints and fevers are less frequent and less deadly; and it is now felt that, when temperance is observed, and ordinary prudence exercised in avoiding what are known to be causes of disease, life is not, to most constitutions, materially more insecure in this country than in Europe. It is quite possible that we may still have something to learn on this head, and that an improvement in medical practice, together with an increased diffusion of the knowledge of those physiological principles on which the preservation of health depends, may lead to such results as will induce Insurance Companies to grant policies on terms still more favourable than those which they at present offer to persons resident in Ceylon. It is not my intention, however, at present to enter upon this wide field, but merely to lay before you certain statistics connected with one branch of the subject, which my position has enabled me to procure.

While the increased security of the life of the adult European resident in Ceylon is generally admitted, it is still felt to be a hazardous experiment to attempt to bring up the children of European parents in this climate; and many of us have had painful experience in our own families of the necessity of sending our children to England, when they have just arrived at that age when parental care is beginning to be of the greatest importance for the formation of their characters, and when the domestic affections can best be cultivated. If this could be shewn to be a mistake, arising

from an injudicious mode of treating our children, there are, I suppose, few European parents resident in the Island, who would not hail the discovery as removing one of the most painful circumstances attendant upon the expatriation which is their own lot in life. Now, this is just the conclusion to which I have been led, by an examination of the records of the Asylum for Military Orphan Boys.

That Institution has been established for about twenty years, during the last eighteen of which it has been under superintendence. There are at present 22 boys resident in it; there have been as many as 31 or 32 at one time; the average being not I think under the present number. During the last eighteen years, only four deaths have occurred in the establishment, two of which cannot be fairly regarded as belonging to its ordinary rate of mortality, inasmuch as one was the result of leprosy, (which must be regarded as an entirely exceptional case,) while the other was that of a deformed idiot, labouring under confirmed disease, who, being left entirely destitute, was received into the Asylum merely that he might die there in peace. The ordinary rate of mortality, therefore, making these deductions, is very little over one half per cent. per annum; and even if we include the two extraordinary cases which I have mentioned, it will amount to no more than one in ninety-nine; and even the higher of these rates can scarcely be regarded as indicating any peculiar unhealthiness in the climate. Nor does the appearance of the boys lead to a different conclusion from that suggested by the low rate of mortality amongst them. They do not, of course, exhibit the florid complexions which are looked for in healthy school-boys in Europe; but they are deficient neither in strength, health, nor spirits, and amongst them might be pointed out some who, physically, are inferior to few who have been brought up in a more temperate climate. I could name one young man, who having entered the Asylum at the age of 12, left it when he was 19, in order to be employed on a Coconut

Estate near Jaffna ; after having been about four years in the Northern Province, he called upon me about a year ago, when on his way to take charge of an estate near Colombo. His appearance was such, that I remarked at the time, and the remark was confirmed by others who saw him, that had he just arrived by steamer at Galle, he would not be regarded as a bad specimen of a healthy European.

Another lad, the son of a European father by a half-caste mother, who, according to the record that we have of him in the Asylum, cannot now be more than nineteen, was apprenticed by me a few years ago to an Apothecary in Kandy. Not liking his employment, he ran away. After fruitless inquiries in several quarters, and getting one or two vessels searched, I gave him up as one of whom I was not likely to hear again. A short time ago, however, I received a letter from him, giving me some account of his adventures, and informing me that he was, when he wrote, a Serjeant in H. M. 24th Regiment, at present stationed in the Mauritius.

These facts seem to shew that the children of European parents can be reared in this country without any greater mortality than is usual in more favoured climates, and that those so reared are not inferior in spirit and energy to others of the same race. Why is it that we find the result so different with our own children ? I believe the true answer to this question to be, that we do not follow a judicious system in our treament of them. We pamper their appetites —we indulge them with improper food at improper times— we coax them to eat when their stomachs reject the food that we press upon them, under the mistaken notion that the exhausting character of the climate renders necessary a larger supply of food than would suffice under a lower temperature.

Every thing at the Orphan School, on the other hand, is done by rule—no food of any kind is given, except at appointed hours. Unwholesome food is at all times carefully excluded. No indulgencies, in the way of a more delicate

diet, are allowed, except by the order of the Medical attendant, and then nothing more is given than he prescribes.

A Dietary was laid down for the Institution by the late Dr. Rowe, who was Principal Medical Officer in Ceylon, about ten years ago. A few trifling alterations have been made since then, and the subjoined table shews the manner in which the food of the boys is now regulated.

No extraordinary pains are taken to preserve the boys from exposure to the sun—indeed we are obliged, from the situation of the Asylum, to march them a distance of about a furlong at 8, 10, and 11 A.M., and again at 2 P.M. Their unusual health and strength is, I believe, under God's blessing, to be ascribed wholly to the judicious system that has been laid down for their management, and to the strictness with which that system has been adhered to.

If the publication of these remarks should have the effect of leading fond mothers to desist from the mistaken practice of pampering and over-feeding their children, and to adopt a regular and judicious system of feeding them, I entertain no doubt that the result will be the prevention of much of that suffering consequent upon the early breaking up of families, which, in too many instances, are never reunited on earth, and the members of which can scarcely ever acquire afterwards that domestic intimacy with each other, which is the result of early habitude.

Dietary.

7 A.M. Coffee, bread.

10 A.M. Coffee, bread, every morning. Eggs, jelly, butter, plantains, in rotation.

2½ P.M. Rice and beef-curry every day, occasionally roast beef and vegetables.

A bread pudding every Sunday.

5 P.M. Coffee and bread

Quantity of Provisions allowed daily for each boy.

Beef,	¾ lb.	When eggs are given, each boy has two.
Bread,	14 oz.	
Coffee,	½ oz.	When butter is given, 1½ lb. is divided amongst twenty-two.
Rice,	½ pint	
Salt,	½ oz.	
Sugar,	2 oz.	
Milk,	¼ bottle.	

APPENDIX.

PROCEEDINGS OF MEETINGS.

GENERAL MEETING.

December 17th, 1859.

Present:

J. STERLING, Esq., Acting Chief Justice, in the Chair.

The Secretary read a list of the books and Periodicals received since the last meeting, viz :—

Calcutta Review	...	2	Nos.
Journal of Madras Literary Society	...	2	,,
Do Bombay Geographical Society	...	1	,,
Do Asiatic Society of Bengal	...	1	,,
Do Asiatic Society of Shanghai	...	1	,,
Engineer's Journal	...	3	,,

On the system of Phonetic Alphabets, by J. E. Thompson, M.C.S., from the Author.

The following Contributions to the Museum were announced :—

Twelve specimens of Medicinal Oils of Ceylon, from Mr. C. P. Layard.

A number of Dyewoods and Dyestuffs, from Mr. H. Mead.

Samples of Plantation Coffee, from various gentlemen.

A Jungle Cat, from Lieut. Robertson.

A Cobra Capella, from Mr. J. Thompson.

The following gentlemen were then ballotted for, and declared elected Members of the Society :—

BOYD MOSS, Esq., F.R.C.S. ...	Proposed by Mr. J. Capper. Seconded by Mr. Jas. Alwis.
J. F. DICKSON, Esq., C.C.S. ...	Proposed by Mr. J. Capper. Seconded by the Rev. B. Boake.

F. B. MAINGUY, Esq., R E. ..	Proposed by the Rev. B. Boake. Seconded by Mr. J. Maitland.
R. A. ROBINSON, Esq., .. and	Proposed by Mr. J. Capper. Seconded by Mr. C. A. Lorenz.
C. HILL, Esq.	Proposed by Mr. J. Maitland. Seconded by the Rev. J. Thurstan.

It was then moved and resolved, that Mr. C. P. Layard be elected President of this Society for the current year, in the room of the late Sir William Carpenter Rowe, and further, that the Rev. B. Boake, Mr. Lorenz, and Mr. Capper, do form a Sub-Committee to draw up a suitable expression of the Society's sense of the loss sustained by the death of its late President.

Mr. Maitland explained, that the sudden departure of Dr. Kelaart from Colombo, on special duty, prevented the reading of his paper on that day it would, however, be forthcoming at the General Meeting. He also exhibited a full-sized model of the iron and coir fencing proposed by Dr. Kelaart to be employed for the protection of the young Pearl Oysters on the freshly-formed beds.

Mr. Boyd Moss then read a paper on "Ceylon as a residence for Europeans, considered in reference to health."

GENERAL MEETING,
July 28th, 1860.

Present:

The Honorable the CHIEF JUSTICE, as Vice-Patron, presided.

Sir E. Creasy, on taking the Chair, said:—"It is with great pride and pleasure that I have accepted the offer so kindly conveyed to me, through my friend Mr. Lorenz, of this honorable position in your Society. Although my own literary pursuits have been chiefly directed to the histories and languages of Europe, I have always taken a deep interest in Oriental ethnology, and in the historical evidences which the literature and the architectural monuments of the East supply, as to the early habitations and movements of the human race. It has also been my good fortune to have among my near connexions and friends, men, to whom the study of Asiatic antiquities and languages has been for years a favorite occupation; and among whom I have frequently heard the most important questions connected with Oriental lore discussed with ample learning and keen sagacity, and with all the freedom and vivacity of unrestrained familiar conversation. As soon as I was aware that Ceylon was to be my future

residence, I determined to endeavour to join this Society; though I fear that the nature of my principal former studies, and the requirements on my time which my duties will create, are likely to make me a very inefficient member of your Association. But I shall, at least, watch your labours with cordial good-will and deep attention. Ceylon and Sinhalese literature are so pre-eminently rich in ancient monuments and ancient records, that it is here we may hope to see good work done towards deciding many questions now earnestly discussed by the scholars and philologists of England and Germany.

Especially there is the great dispute which Gibbon indicated, and which is now warmly revived, whether the East really gave arts, letters, and civilization to the West, or whether all that is of any value in Oriental literature and art, was not derived from a north-western source. I intimate no opinion of my own on this or on the other great questions, as to the primary seats and early currents of population. But I know that they are questions on which many master minds are now intent, and I know that I see here an Association peculiarly qualified to throw light on them.

Your researches in Statistics, in Geology, and in the Fauna and Flora of this remarkable Island, command also the deepest interest. They have indeed an immediate practical value, which ensures for them the regard of many who would pay comparatively little heed to merely literary topics. I am sure that the time which you devote to the furtherance of the objects of this Society is employed with utility to others as well as with intellectual benefit to yourselves. I once more cordially thank you for the gratifying manner in which you have enrolled me in your ranks, and pledge myself that I will do all in my power to deserve it."

The following gentlemen were then ballotted for, and declared elected Members, viz:—

Col. OUVRY, C.B.	Proposed by Mr. J. Capper. Seconded by Mr. C. P. Layard.
Mons. P. GRIMBLOT. ...	Proposed by the Rev. B. Boake. Seconded by Mr. J. Capper.
W. N. D. RAJAPAKSE, Esq.	Proposed by Mr. C. A. Lorenz. Seconded by Mr. C. P. Layard.
The Rev. C. MERSON. ...	Proposed by Mr. J. Maitland. Seconded by Mr. Jas. Alwis.

The Secretary placed on the table the following list of Donations to the Museum:—

Twenty-three land shells from Mr. C. P. Layard; four New Zealand Pheasants, a specimen of Kandyan paper 40 years old, and three Ancient Sinhalese Coins from the Honorable Major Skinner.

A set of Pearl Oyster Shells, of various ages, by the Secretary.

The following Books and Periodicals were reported as received since last meeting :—

A Report on Public Instruction in Bengal, from the Honorable the Colonial Secretary.

Meteorological Observations during the seven years ending 31st December, 1859, from R. Bullen, Esq., R.E.

The Asiatic Journal	5	Vols.
Report on the Natural History of the Pearl Oyster, by Dr. Kelaart	1	,,
Romanic Alphabets	1	,,
An Enumeration of Ceylon Plants, by G. H. K. Thwaites	1	,,
The Calcutta Review	2	Nos.
Journal of the Asiatic Society of Bengal ...	3	,,
Transactions of the Bombay Geographical Society	1	,,
Journal of the Madras Literary Society ...	1	,,
Journal of the Geological Society of London ...	8	,,
Journal of the Statistical Society of London ...	8	,,
The Engineer's Journal	8	,,

Major Skinner said, that he had received a communication from Sir W. Denison, the Governor of New South Wales, who was desirous that an exchange of specimens should take place between the Public Museum of Sydney and the Ceylon Asiatic Society, and he therefore begged to move the following resolution :—

"That the Curator and Secretary be requested to communicate with the authorities of the Museum at Sydney, with the view to establishing a system of Exchanges."

The resolution having been seconded, was carried.

Mr. J. D' Alwis called the attention of the Meeting to the fact that there were several Chapters of the *Mahâwanso*, translated by the late Mr. George Turnour, that had never been published, in the hands of that gentleman's Executors. He wished to propose the following resolution, which was seconded and adopted :—

"That the Secretary be requested to communicate with the Executors of the late Mr. Turnour, with a view to obtaining their permission to print such translated Chapters of the Mahawanso as remain in manuscript in their hands."

The Rev. Mr. Boake submitted the following resolution :—

That the following gentlemen be requested to form a Corresponding Committee, for the purpose of entering into communication with Scientific Societies in Europe and elsewhere, viz :—

The Honorable the Chief Justice,
Mons. Grimblot,
Mr. Capper."

Seconded by Mr. Lorenz, and carried.

Mr. W. Ferguson exhibited a dwarfed specimen of *Melia Azedarach*, Lin., and a plant *Holcus Sorghum*, making a few remarks respecting them.

The genus *Melia* consists of trees, the *M. Composita*, or *Lunumidella* of the Siphalese being well-known as a fast-growing and tall tree, the timber of which is so light, that it is generally used for outriggers to the fishing canoes, while the species of which a small specimen was exhibited, is well-known throughout Ceylon, as a tree generally from 10 to 20 feet in height, and commonly called the "Flowering Margosa," having large branched panicles of beautiful lilac-coloured flowers.

The small specimen shewn by Mr. Ferguson was taken up and dried early in May last, and was one of several plants raised from seeds sown only three months previously, (all of which struggled for existence during the late dry weather,) but only this one was observed to flower then ; but about a fortnight ago, six or seven more produced a single flower each in the same manner, some of them very large and partly monstrous.

The dried specimen shewn had still the cotyledons on ; when it flowered these were ½-an-inch from the ground, a small pair of opposite leaves 1 inch, and another 1½ from the ground, while eight alternate leaves occupied other 2 inches of the stem, and then came the last leaf about ¼ of an inch higher in the axil of which grew the sessile flower,—the whole height of the plant being only 3½ inches, the root, a single one, being about 5 inches long.

Mr. Ferguson considered this plant a good illustration of the principle, that flowers and seed vessels are merely modified forms of leaf.

In good soil and in ordinary weather, the plant in question would have become a small branching tree, but here its growth was arrested, and true to its vegetable instincts, if such a term can be used, it made desperate efforts to preserve its species by producing a flower. This flower occupies the place of the central bud of the plant ; it has no calyx, but the top leaf, in the axil of which it rests, has also departed from its normal form, having divided and grown round the flower, so as to form an involucre

for it. The rest of the flower, viz., petals, tube surrounding the stamens, the stamens and pistil, were a little different from their ordinary form, but in one sent to the Director of the Peradeniya Gardens the day before, the flower was much larger than ordinary, and was somewhat monstrous. These plants were grown in Mr. W. Ferguson's garden at Kollupitiya, and Mr. Ferguson has observed, that in some of them, the flowers and mid-leaf have dropped off, and the plants have taken a fresh start, but sending out two branches from the place just below where the flower was.

In connexion with the subject of dwarfed plants, Mr. Layard, the Government Agent for the Western Province, stated, that some years ago he procured from a native garden, a coconut plant of the common kind, about two Years old, which had flowers close to the ground.

The specimen of *Holcus* shown, was fully 12 feet high, and about one inch in diameter, having a large compact panicle of white seed on the summit, with several branches proceeding from the upper joints, while from the lower ones, clusters of aerial roots, like those of the screwpine, issued. The plant was taken from several growing in the garden behind the Government Offices in the Fort, raised from bazaar seeds, sown about three months previously.

Mr. W. C. Ondaatjie then read a paper on "Badulla, and its Productions," and Mr. J. D' Alwis an article on "Cinnamon."

GENERAL MEETING,

November 24th, 1860.

Present:

The Rev. B. BOAKE, Vice-President, in the Chair.

Rev. J. THURSTAN.	Colonel OUVRY.
P. COOMARASAMY, Esq.	J. D' ALWIS, Esq.
Mons. P. GRIMBLOT.	R. DAWSON, Esq.
L. NELL, Esq.	J. CAPPER, Esq.

The following Books and Periodicals were laid on the table:—Madras Journal, Pamphlet on the Dugong Oil, Engineer's Journal, Meteorological Register.

The Secretary called the attention of Members to the prospectus of Messrs. Schlagentweits's work on India and Upper Asia, forwarded by the publishers, and it was resolved that the work be subscribed for.

A Circular from the Secretary of State for the Colonies was also laid on the table, in which information was sought in respect to scientific works published in the Colony, Museums, &c.; also a letter from Mr. D. Wilson.

handing a communication from the Batavian Society of Arts. Both these documents were referred to the Committee of Correspondence.

The Secretary laid before the Meeting copies of letters from the late Dr. Buist and Sir J. Emerson Tennent to the *Athenæum*, having reference to certain passages in the work on Ceylon by the latter, in which the presence of the Fresh Water Wells in the Jaffna Peninsula near the sea is accounted for, on the supposition that they are supplied from the sea; the water becoming deprived of its salt by the filtration through the coral mass around. Dr. Buist controverts this theory as opposed to the first principles of physics, whilst in reply, Sir Emerson Tennent urges the facts brought forward by De Witt, in the Philosophical Magazine, to shew that water containing considerable quantities of saline matter in solution, may, by percolating through great masses of porous strata during long periods, be gradually deprived of its salts to such an extent as probably to render even salt-water fresh. The publication of this controversy might probably lead to some further enquiry into the matter as regards the fresh-water wells at Jaffna.

The following gentlemen were then balloted for, and declared duly elected:—Mr. W. J. Sendall, Mr. W. C. Ondaatjie, Mr. C. P. D'Zilva, Mr. J. A. Caley, and Mr. R. Piachaud.

The undermentioned Papers were then read:—

"The difference of the Páli and Mágadhí dialects of Vararuchi," by Mr. J. D' Alwis.

"On Health and Diet, with especial reference to Children and Youths in Ceylon," by the Rev. B. Boake, B.A., Vice-President.

"On Hindú Philosophy," by Mr. Coomarasamy.

ANNIVERSARY MEETING.

Saturday, July 6th, 1861.

Present:

The Rev. B. BOAKE, in the Chair.

Colonel OUVRY.	J. MAITLAND, Esq.
R. V. DUNLOP, Esq.	Rev. J. THURSTAN.
P. COOMARASAMY, Esq.	W. D. RAJAPAKSE, Esq.
N. D. SCHULTZE, Esq.	Dr. MISSO.
W. C. ONDAATJIE, Esq.	

The Secretary proceeded to read the Report, as follows:—

In submitting their Report for the past year, your Committee have much pleasure in pointing attention to the steady increase in the Members of the Society, and especially to the fact, that amongst those who have joined during the present year, are gentlemen eminently qualified to advance the objects of this Institution.

Amongst the Papers read at the various meetings of the past season, may be found some possessing more than ordinary local interest,—on "Health and Disease of Ceylon"; on "Diet"; on "the District of Badulla and its Products"; and on "Cinnamon,"—whilst "Hindu Philosophy," and the "Pali Dialects" have formed the objects of other Papers. The Society has received several interesting communications from the Government, one of which directed attention to the increasing value of the oil obtained from the "Dugong," as a substitute for Cod Liver Oil, and will be found in the Appendix.

Your Society has been placed in communication with the Curator of the Public Museum of New South Wales, through Sir W. Denison, and it is hoped that this may prove the means of an interchange of specimens of the products of the two countries, to the advantage of both institutions. It is also in communication with the Batavian Society of Arts, to which body copies of the Journal have been sent. Your Committee have much pleasure in noticing the receipt from the Messrs. Schlagentweit of a portion of the great illustrated work which is to record theirtravels and observations in Upper India, and it has been resolved to recommend to you, that the abovenamed gentlemen be elected Honorary Members of your Society, with a view to mark the appreciation of their gift, and of the great labour and scientific research expended in their work.

The publication of the remaining chapters of the *Mahâwanso*, left in the hands of the Executors of the late Mr. George Turnour, has engaged the attention of your Committee, who have communicated to those gentlemen their desire to be allowed to publish the chapters in their hands, in the shape of an Appendix to the Society's Journal. To this request, however, no reply has yet been received.

The Society has also had its attention directed to the subject of "the Fresh Water Wells of Jaffna," through a correspondence which took place between Sir James Emerson Tennent and the late Dr. Buist, and which correspondence will be found in the Appendix to the forthcoming issue of the Society's Journal.

Your Committee cannot omit mention of the exhibition of Ceylon produce, held at the Queen's House in February last, under its direct management. The time allowed for collecting the many specimens exhibited was necessarily short, but your Committee were enabled by the active co-operation of gentlemen at outstations, to bring together a most interesting and instructive collection, illustrative of the industry and resources of the Western, Central, North-Western, and Southern Provinces. Many of the objects exhibited have been since placed in the Society's Museum, which is at length beginning to assume a proportion that will soon render a Catalogue necessary.

Your Committee have recently communicated with the chief Military authorities of the Island, with a view to ascertaining whether there would be any objection to the amalgamation of the Medical Museum with that of this Society, in the event of a qualified Curator being provided for the proper custody and enlargement of the collection; and your Committee, although not as yet in possession of any reply to their application, have grounds for believing that their request will be complied with.

Since the last Anniversary Meeting the Society has lost several valued members, foremost amongst whom may be named the late Sir William Carpenter Rowe, whose attachment to, and exertions on, behalf of the Society, are well known to all its members.

The Society has also experienced a loss in the death of one of its oldest and most industrious members, the late Mr. Simon Casie Chetty, who contributed some most valuable papers to your Journal, and by these and other literary labours gave evidence of not only an intimate acquaintance with Tamil literature, but of a spirit of industrious research, of patient investigation, and of scholarly descrimination, rarely to be met with in the East.

In recording their deep sense of these losses, the Committee are able, at the same time, to notice the accession to your body, of the present Chief Justice of Ceylon, who has already given an earnest of his good wishes on your behalf. Your Committee would also congratulate you on having obtained the valuable co-operation of so eminent a Páli scholar as Monsieur Grimblot.

This gentleman has consented to undertake the duties of Joint Secretary, and we may reasonably hope, that by the aid of his Oriental acquirements, the future proceedings of this Society will take a wider range, and assume a more elevated tone, whilst by means of translations and republications of some of the standard Historical and Buddhistical works of Ceylon, you may be the means of aiding the students of Páli literature in every part of the world. During the past year, the Society's Library has received many valuable additions, as may be seen by the Librarian's List.

The Museum has likewise been increased by many donations, chiefly of objects from the late Exhibition at Queen's House; but much yet remains to be done towards obtaining a collection of the many Raw Products of the Island, a large portion of which your Committee believe to be unknown to Europeans, but which might probably prove of considerable value as articles of export, or for local use.

Your Committee regret they are unable to report that the Society's Journal, for the past year, is in a very forward state, the great pressure of work in the Government Printing Office having prevented its progress until very recently.

It would appear that, if it be thought desirable that the Journal should be published with greater rapidity, and at more frequent intervals, it will be necessary that the Society undertake the printing at its own cost. Your Committee have commenced to reprint the earlier Numbers of the Journal, for which there exists an active demand both here and in Europe.

The Treasurer will place before you a statement of the accounts of the past year, from which it may be seen that there is a balance in hand of £80 11*s.* 9*d.*

In conclusion, your Committee beg to submit for your consideration, a list of the proposed Office-bearers for the ensuing year.

Resolved:—"That the Report now read be adopted and printed in the current Number of the Journal."

Resolved:—"That the following list of Office-bearers be adopted for the ensuing year."

Proposed by Dr. Misso.
Seconded by R. V. Dunlop, Esq.

President:
Sir EDWARD S. CREASY, Chief Justice.

Vice-Presidents:

The Rev. D. J. GOGERLY.
The Rev. B. BOAKE.

Secretaries:

Monsieur P. GRIMBLOT.

J. CAPPER, Esq.

Treasurer:

C. A. LORENZ, Esq.

Librarian:

Monsieur P. GRIMBLOT.

Committee:

C. P. LAVARD, Esq.
Colonel OUVRY.
J. F. DICKSON, Esq.
B. MOSS, Esq.
W. C. ONDAATJIE, Esq.
P. COOMARASAMY, Esq.
J. D'ALWIS, Esq.
R. DAWSON, Esq.
Rev. J. THURSTAN.

The following gentlemen were then proposed, and after a ballot, declared duly elected Members of the Society:—

Dr. R. Dane, P.M.O.
G. B. Capper, Esq.

The Proceedings were terminated by a vote of thanks to the Chairman.

LETTERS FROM SIR J. E. TENNENT AND DR. BUIST, TO THE "ATHENÆUM," RELATIVE TO THE FRESH WATER WELLS OF JAFFNA.

Allahabad, N. W. Province,
June 10, 1860.

IN this out-of-the-way quarter of the world, where we are only beginning to replace the books the mutineers burned, and are drawing cautiously on our bookseller, in case a catastrophe of the like kind should occur again, I trust that you will pardon me for turning to a work reviewed in your pages eight months ago,—Sir Emerson Tennent's "Ceylon,"—which I have not been able to peruse, and of which I can only speak from the extracts I have read in the *Athenæum* and the *Edinburgh Review*, both of October. But the few points I desire to take up are of general and permanent interest, and have hitherto, as it seems to me, not been noticed in the manner they deserve. In both the reviews referred to, I find the following notice of the musical sounds

heard in Chilka Lake, a salt-water creek close by Batticaloa, on the eastern shores of Ceylon :—

"I distinctly heard the sounds in question. They came up from the water like the gentle thrills of a musical chord, or the faint vibrations of a wine-glass, when its rim is rubbed by a wet finger. It was not one sustained note, but a multitude of tiny sounds, each clear and distinct in itself ; the sweetest treble mingling with the lowest bass. On applying the ear to the wood-work of the boat, the vibration was greatly increased in volume by conduction. The sounds varied considerably at different points, as we moved across the lake, as if the number of the animals from which they proceeded was greater in particular spots ; and occasionally we rowed out of hearing of them altogether, until, on returning to the original locality, the sounds were at once renewed."

Will your readers oblige me by comparing this with the following note I published of Musical Fishes in a salt-water creek near Bombay, in the *Bombay Times* of January, 1847 :—

"A party lately crossing from the promontory in Salsette called the Neat's Tongue, to near Sewree, were, about sunset, struck by hearing long distinct sounds like the protracted booming of a distant bell, the dying cadence of an Eolian harp, the note of a pitch-pipe or pitch-fork, or any other long-drawn-out musical note. It was, at first, supposed to be music from Parell floating at intervals on the breeze ; then it was perceived to come from all directions, almost in equal strength, and to arise from the surface of the water all around the vessel. The boatmen at once intimated that the sounds were produced by fish, abounding in the muddy creeks and shoals around Bombay and Salsette ; they were perfectly well known, and very often heard. Accordingly, on inclining the ear towards the surface of the water, or, better still, by placing it close to the planks of the vessel, the notes appeared loud and distinct, and followed each other in constant succession. The boatmen next day produced specimens of the fish—a creature closely resembling in size and shape the fresh-water perch of the north of Europe—and spoke of them as plentiful and perfectly well known. It is hoped they may be procured alive, and the means afforded of determining how the musical sounds are produced and emitted, with other particulars of interest supposed new in Ichthyology. We shall be thankful to receive from our readers any information they can give us in regard to a phenomenon which does not appear to have been heretofore noticed, and which cannot fail to attract the attention of the naturalist. Of the perfect accuracy with which the singular facts above related have been given, no doubt will be entertained, when it is mentioned that the writer was one of a party of five intelligent persons, by all of whom they were most carefully observed, and the impressions of all of whom in regard to them were uniform. It is supposed that the fish are confined to particular localities —shallows, estuaries, and muddy creeks, rarely visited by Europeans ; and that this is the reason why hitherto no mention, so far as we know, has been made of the peculiarity in any work on Natural History."

Now, it was nearly impossible for Sir Emerson Tennent to have seen this, as it was altogether impossible for me to have known in 1847 anything about his visit to the Chilka Lake the following year ; and both descriptions, which, so far as the sounds of the fish are concerned, are in perfect harmony, are those of independent observers speaking of the same phenomenon, which I doubt not in both cases admits of the same

solution. In 1858, the present Governor of Ceylon visited Chilka Lake; he was obviously not aware of what Sir E. Tennent had heard or seen ten years before; his book was not published till 1859. He gives the following account of the music in the water, which is as nearly as possible the same as had been previously given. Mr. Ward being once more a perfectly independent witness:—

"I ought not to take my leave of Batticaloa, which I may not have an opportunity of revisiting, without mentioning the natural phenomenon for which its lake is remarkable—the singing fish. I was too ill during my stay in 1857 to expose myself in the night air upon the water, and I confess that, in spite of the impression then made upon my fellow-travellers, amongst whom were Major Gen. Lockyer and Capt. Gosset, I went out upon the present occasion with a considerable amount of incredulity, and was the last to believe the evidence of my own senses; Dr. Johnston being satisfied as to the existence of a sound apparently proceeding from the water long before I could realise it. But after changing the position of the boat once or twice, there could be no doubt about the matter. The sound rose and swelled, and absolutely vibrated about us in a manner that left no question as to the fact, whatever may be the causes. Its character is indescribable. It is not like any other sound. It is only heard at night. It has nothing harmonious or musical about it. There are no modulations, no variety of notes, except what the increase and decrease in strength produced. As to its origin, nobody knows anything. It may be the fish, to whom it is popularly attributed. It may be the rush of air through rocks partially hollowed. There is nothing but conjecture to guide us in this respect. The results all can vouch for. And these results are certainly more distinct within a limited distance from the shore, though heard occasionally in deep water. I am no naturalist. I can only state what I personally saw and experienced. Others must explain it. Something similar, it is said, occurs in the Bay of Naples. It is strange that between Naples and Batticaloa there should be this one point of resemblance."

Sir Emerson Tennent describes the same thing as heard by him at the same place in 1848; but he doubts if the sounds proceeded from fish, and ascribed them to shell-fish.

The following is an extract from a letter (February, 1849) I received a few weeks after the first notice had been published:—

"*Musical Fish.*—Sir,—In a late number of the *Times* I noticed some remarks respecting the musical fish, as they have been rather aptly termed; and it may be interesting to the readers of the *Times* to be informed, that the existence of such a phenomenon has been long known to the residents at Vizagapatam. I have heard the musical sounds, like prolonged notes on a harp, when rowing on the back water at that station; and they were generally supposed to proceed from the fish coming in contact with the sides of the boat. To the best of my recollection, the sounds were never heard at a distance from it."—*Bombay Times*, Feb. 13.

Vizagapatam, on the Coromandel Coast, is 498 miles north of Madras, the shores abounding with shallow salt-water creeks, like those on the eastern side of Ceylon, and all along the Malabar Coast. I think that I have very clearly made out that musical fishes do exist in abundance;

and as it is very difficult to conceive in what way the sounds are made under water, it would be well to have the subject more minutely inquired into.

I find the following in the Journal of the Samarang. I greatly doubt if it be the same variety of fish that I have noticed that are referred to :—

"Dr. Adams, the surgeon and naturalist of the expedition, says :—'While on board the brig *Ariel*, then lying off the month of the river of Borneo, I had the good fortune to hear that solemn acquatic concert of the far-famed organ fish, or drum—a species of Pogonias. These singular fishes produce a loud monotonous singing sound, which rises and falls, sometimes dies away, or assumes a very low drumming character; and the noise appeared to proceed mysteriously from the bottom of the vessel. This strange submarine chorus of fishes continued to amuse us for about a quarter of an hour, when the music, if so it may be called, suddenly ceased, probably on the dispersion of the band of performers.'"

Sir Emerson Tennent notices the fact of all the wells along shore which keep their water during the dry season, being below high-water mark, and that to a small extent they rise and fall with the tides; and he assumes that they owe their water to the sea, which loses its saline matter by percolation. Nothing, surely, is more utterly opposed to the first principles of Physics than the doctrine, that salt held in chemical solution by water should be capable of being separated from it by the mechanical process of filtration. The phenomenon of tides in wells of moderate depth dug near the sea, is of universal occurrence all along the Malabar Coast, where the matter dug through is porous. It does not obtain in wells dug through trap. I have observed it hundreds of times at Bombay, and have often had occasion to describe it. The explanation is easy. The surface of the ground where the well is dug being always six or eight feet above high and twenty to twenty-six feet above low water, and being extremely spongy and porous down to where it comes in contact with the rock, or the blue-clay bed which commonly lies over the rock, it gets charged full of water during the rains. The superior length of column enables this to expel the sea water, a proceeding which must have been completed shortly after the emergence of the land from the sea; while the interestices in the porous soil are so minute as to prevent the two mingling. As the saltest sea water has only a specific gravity of 1·050, the fresh water ponded back from it requires only to be proportionally higher in level to create an equilibrium. With a greater head than this, it will push the wall of salt water before it, and flow off. Of all this I have seen abundant examples at Bombay. It would occupy too much of your space to describe them. After six or eight months of rainless weather, when the discharge from the soil becomes feeble, the wells all become more or less brackish, and the apparent tide increases.

The *Edinburgh Review* states that this theory of Sir E. Tennent's, of the desalinization of sea water by filtration (as already said, a phenomenon opposed to one of the first laws of Chemistry) explains the occurrence of fresh water on coral islands, and confutes the theory of Darwin, that this arises from rain; as rain falling on a substance already fully saturated with sea-water would not be absorbed, but would flow off. Not a doubt of it. But coral islands are not only not saturated, but so much of them as is above the sea-level, three or four feet, is highly porous and perfectly dry, and presents all the conditions for absorbing the whole of the rain that falls on them. They present to the rain this much head of water to push out the sea and expel it piston-wise so far as the coral bed descends,—the sea itself forming the wall of the reservoir. A well dug deep into the coral to draw off the rain-water, with which it is always nearly saturated up to low-water mark, is sure to secure a supply. An illustration of the two not mixing together, if the pores of the soil, rock or coral, be fine enough, may be obtained by making the experiment with capillary tubes.

The red colour with which the sea is tinged round the shores of Ceylon, during a part of the S.W. monsoon, is due to the *Proto-coccus nivalis*, or the Himatta-coccus, which presents different colours at different periods of the year—giving us the seas of milk as well as those of blood. The coloured water at times is to be seen all along the coast north to Kurrachee, and far out, and of a much more intense tint in the Arabian Sea. The frequency of its appearance in the Red Sea has conferred on it its name.

Our author mentions terraces of marine shells embedded in agglutinated sand as prevailing all around the island at a level considerably above highwater mark. The same thing obtains all around the shores of the Mauritius, the Eastern Archipelago, the shores of Hindustan, the Arabian Sea and Red Sea, and, I believe, along the coasts of nearly all the seas in the world. The Reviewer states truly, that "this is an unquestionable evidence of an upheaval—the evidence of subsidence is more difficult to obtain." He is mistaken. From Cape Comorin to Kurrachee on the one side, and so all around the shores of the Bay of Bengal on the other, multitudes of mangrove roots, their fibres unbroken, and obviously existing where they grew, are found embedded in blue marine clay, from ten to twenty feet below the raised beaches, the surfaces of which, when formed, must themselves have been below half-tide,—as clear an evidence of a previous depression as the beaches are of an upheaval.

I trust I shall not be for a moment supposed inclined to criticize, much less to correct, this admirable and obviously most attractive work. I have taken some texts from it, from which to give some brief discourses on points of natural history which seem of interest, and which, though perfectly familiar to the old Indian, seem scarcely to have reached the English naturalist at all.

GEO. BUIST.

London, August 11, 1860.

I have seen in the *Athenæum* of this morning the interesting letter of Dr. Buist, dated Allahabad, June 10, in which exception is taken to a passage in my recently published work on Ceylon, where I have ventured to offer a simpler solution of the phenomenon of the steady supply of fresh water in wells sunk in coral islands, than that heretofore resorted to,—namely, the conjecture that the flow consists of rain-water imbibed from the surface, and banked in by the surrounding pressure of water from the sea. This theory, which was first broached in Admiral FitzRoy's "Voyages of the Adventure and Beagle," and in Darwin's "Naturalist's Journal," is thus propounded in the latter, when speaking of the Keeling Islands, in the Indian Ocean, south west of Sumatra, one of those "atoll" groups, in the islets of which there are wells from which ships obtain water:—"At first sight," says Darwin, "it appears not a little remarkable that the fresh water should regularly ebb and flow with the tides; and it has even been imagined that sand has the power of filtering the salt from the sea-water * * The compresed sand, or porous coral rock, is permeated like a sponge with the salt water; but the rain which falls on the surface must sink to the level of the surrounding sea, and must accumulate there, displacing an equal bulk of the salt water. As the water in the lower part of the great sponge-like mass rises and falls with the tides, so will the water near the surface; and this will keep fresh, if the mass be sufficiently compact to prevent much mechanical mixture." —*Darwin's "Naturalist's Journal,"* chap. xx. Dr. Buist's explanation corresponds with that of Darwin; but Darwin, as it will be seen, glances at, although he rejects the theory of filtration from the sea; whilst Dr. Buist urges, that "Nothing is more utterly opposed to the first principles of physics than the doctrine that salt held in solution by water should be capable of being separated from it by the mere mechanical process of filtration." Dr. Buist, however, is not aware that since Darwin wrote, the late Mr. Witt, in a remarkable paper published in the *Philosophical Magazine* for 1856, "On a Peculiar Power possessed by Porous Media of removing Matters from Solution in Water" has made known the results of

experiments carried on by him on behalf of one of the London water-supply Companies, and has shewn that "water containing considerable quantities of saline matter in solution, may, by percolating through great masses of porous strata during long periods, be gradually deprived of its salts, to such an extent as probably to render even salt water fresh." The difficulty which I felt in applying Darwin's ingenious theory to the small coral islands in which fresh water abounds, as well as to wells sunk in the coral formation at the north of Ceylon, arose from the fact, that in the latter, rain falls with such proverbial infrequency as to be inadequate to furnish the supply of fresh water invariably present; whilst in the numerous little coral islands to the west, the area of each is so minute, that their surface, even in the most rainy seasons, could not intercept enough to replenish the wells. Mr. Witt's discovery came opportunely to aid, and facts are recorded in other portions of my book (vol. 1, p. 20; vol. 2, p. 536) besides those which alone Dr. Buist appears to have seen, that in my mind establish the fact that these wells are supplied, not by the banking in of rain by the surrounding salt water, but by the slow percolation of water from the sea through the masses of porous coral.

J. Emerson Tennent.

It is requested that all communications to the Honorary Secretaries may be forwarded to them under cover to the Hon'ble the Colonial Secretary.

Specimens for the Society's Museum, or Contributions to the Library, may be forwarded free by Parcel Tappal, or by the Government Steamer "Pearl," addressed in a similar manner.