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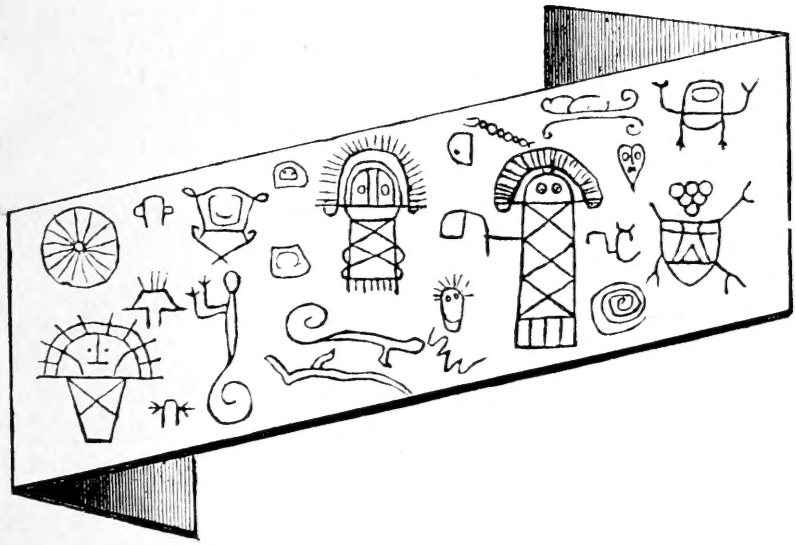

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The Guiana Orchids.

By the Editor.

I.—HISTORY.

TAKEN altogether the family of Orchidaceæ is undoubtedly the most wonderful in the vegetable kingdom, and although the species found in British Guiana are not popular, yet from the point of view of the botanist none are more interesting. There is a fascination about these plants, which carries us away in the same manner as do collections of pictures, coins and postage stamps. Even the English field naturalist gloats over a find of the bee or fly orchis and glories when he gets an opportunity of roaming over the chalk downs in search of the species peculiar to such districts. Beyond all other plants they have a personality as it were—they are hardly ever common, and even when plentiful in certain places, these localities are generally hard to find. Again, they are nature's own darlings, blooming "far from the madding crowd," amidst scenes of the wildest beauty. An English collection recalls visions of the expanse of Salisbury Plain with its Roman camps, white horses, sparkling brooks issuing from the chalk

and flowing through bottoms of reeds and cotton-grass, as well as the pleasant odour of the pine woods, and the delicate colour of cowslip meadows where certain species contrast with the otherwise uniform scattering of these floral gems. Collections of epiphytal species are also rich in memories, especially where they have been gathered personally. This plant was brought from the slopes of Roraima, that from the neighbourhood of the Essequebo falls, here, a dozen species recall the windings of a creek in the Demerara river, and there, others bring to mind the glare of sunlight on the Mourie. Unlike most other plants the interest is particular rather than general. It was not a parcel of seed that was brought, but the plant itself. It is quite possible that there may be still plants in the English orchid houses which were collected by the SCHOMBURGKS or other well-known people, and, as nothing is so generally interesting as traces of personal connection, *orchidophiles* will no doubt record these at some future time. Already something has been done in regard to the extreme rarities and hybrids—these are pedigreed like particular breeds of horses and dogs.

As a small contribution to the connection of the Guiana Orchids with the first collectors and cultivators, we have thought it well, in commencing a series of papers on the Guiana Orchids, to say something about their first introducers into England. When such names as Cattleya, Huntleya and Schomburgkia are mentioned, and we learn that they were given in honour of certain persons, we generally like to know who these persons were. But, while admitting the personal interest of such names we cannot agree with the principle on which they are given. Descriptive names are decidedly better,

even when they are so general as Epidendron (upon a tree, a tree percher) or Dendrobium (a liver in trees). More specific names such as Odontoglossum (tooth tongue); Coryanthes, (helmet flower); Catasetum, (hanging bristle) and Cycnoches, (swan neck), although perhaps not altogether pretty, are very suggestive to the botanist. Another class of names are not descriptive in any way but are nevertheless better on the whole than those which commemorate the discoverer or first cultivator. Some of these are very pretty indeed and have been used as christian names for girls, all orchid names being of course feminine; Vanda, (the Hindoo name of the type species), Lælia, (a vestal virgin) and Phajus (shining) are examples of this class. Some commemorative names, as Bletia, Brassavola and Stanhopea, are also pretty, but as so many others are difficult to pronounce or have to be altered considerably in latinising, they should be avoided as much as possible. However, we must not go too far in condemning what we are now about to make the subject of our paper.

The first epiphytal orchids were imported into England a little over a century ago, from the West Indies, mostly from Jamaica. They were much admired, but rarely lived more than a few months, only flowering sometimes in a last dying effort. In 1791 Epidendron fragrans was figured in the Botanical Magazine, which stated that instances of "parasites" flowering in England were very rare. Commodore GARDNER, in 1789 presented to the Apothecaries' Company some plants he had brought from Jamaica, and this one had lately flowered. It was planted in a pot of rotten wood and decayed leaves, and plunged in a tan pit, treatment which probably killed it

after flowering. The next species to be figured was Epidendron ciliare, which flowered in February 1799, at Mr. WHITLEY'S, Old Brompton, where it was grown in loam and peat, and also plunged in the tan-pit, with the natural consequence that, as stated in the Magazine, it never assumed a fine healthy appearance. In 1802 the same periodical, speaking of another Jamaica orchid, said that since MILLER's time many species had been brought to flower in great perfection; they had figured five, and had drawings of several others.

Thus a commencement was made with plants common to Jamaica and Guiana, and from that time increased interest was taken in their cultivation, although the proper mode of treating epiphytes yet remained to be discovered. Until about the year 1830, nothing certain could be formulated, and even then opinions differed. Dr. LINDLEY, writing in that year, said that 22 or 23 species were brought to Kew in the last decade of the previous century and about 14 added up to the year 1813, after which new plants were continually being introduced until the number had then reached about two hundred. Mr. WILLIAM CATTLEY of Barnet, an amateur, whose name is commemorated in the genus Cattleya, was one of the first to take an interest in orchids, and Messrs. LODDIGES of Hackney cultivated them for sale.

About this time (1830) a gentleman named JOHN HENRY LANCE, then living in Surinam, took a great interest in orchids, and sent a number to Messrs. LODDIGES. Among the first of these was the swan orchid (Cycnoches Loddigesii) which was described as a beautiful and extraordinary plant. This, as may be seen, was named after the nurserymen, but the collector's own name was given

to the Brassia Lanceana, imported in 1833. The name Brassia had already been given to a species from Jamaica, to commemorate a Mr. BRASS, who collected plants in Africa for Kew Gardens. Mr. LANCE returned to England in 1834, bringing with him a large collection of orchids, and among them one of which the growers spoke very highly. This was the Oncidium Lanceanum, the plant so well-known in Georgetown, and appears to have been stuck up in trees about Paramaribo as it is here. It first flowered at Loddiges', afterwards at the Horticultural Society's Gardens, and was called a charming epiphyte. About the same time that Mr. LANCE was collecting in Surinam, Mr. BATEMAN, of Knypersly, an enthusiastic lover of orchids, sent Mr. COLLEY to Demerara in search of new species, with the result that several additions were made to the English collections. Their names are coupled together in Batemannia Colleyi, but this rather dull-coloured and insignificant plant was only one of the finds of the expedition. Burlingtonia candida (named after the Countess of BURLINGTON) flowered in 1835 with Mr. BATEMAN, and it was stated that no flower could be more perfectly lovely—nothing sullied the snow-white transparency unless it was the faint dash of straw colour on the lip. Trigonidium obtusum was introduced by Mr. COLLEY and Zygopetalon rostratum, Coryanthes maculata, described as a splendid species, Maxillaria Batemanii, as well as several Catasetums appear also to have been carried from Demerara by the same collector.

Mr. C. S. PARKER, of Annesley near Liverpool, seems to have collected plants in the colony about the same time; his name is commemorated in Maxillaria Parkeri and he

appears to have been the first importer of Gongora. Mr. MOSS, of Liverpool, was another collector and it was with him that Scuticaria Steelii first flowered. The specific name commemorates Mr. MATTHEW STEELE, father of Mr. G. B. STEELE, who sent it from Demerara. A third Liverpool gentleman whose name is also familiar (Mr. BOOKER) was the first to flower Catasetum (Myanthus) deltoideus which had been found by Mr. JOSEPH HUBBARD near the Great Falls of the Demerara river. Besides these Mr. JOHN ALLCARD of Stratford Green, imported orchids from here and it was in his collection that Peristeria pendula and Epidendron chloroleucum first flowered.

The collectors of those days had few Odontoglossums, Cattleyas, Dendrobiums and Vandas to raise their enthusiasm, and were therefore all the more ready to appreciate the orchids from Demerara. In 1838 three forms of flowers were discovered on a plant of Catasetum cristatum, which Dr. LINDLEY said was so very extraordinary that he would not have believed it, if he had not seen it himself. Speaking of Coryanthes macrantha, the same botanist said, " accustomed as we are now become to strange forms among orchidaceous plants, I doubt whether any species has yet been seen more remarkable for its unusual characters."

In 1839, SCHOMBURGK'S name first appears in connection with Epidendron Schomburkii, and two or three years after, his " finds" were continually being recorded. Catasetum longifolium was mentioned in 1841 as a plant of great beauty, and peculiar among the Catasetums, while the following year Huntleya violacea was figured and stated to have been found only near the cataracts of the Essequebo. This latter was named after

the Revd. Mr. HUNTLEY "a zealous cultivator of orchids." Sobralia sessilis (after F. M. SOBRAL, a Spanish botanist) Brassia Lawrenciana (after Mrs. LAWRENCE of Ealing Park) and Galeandra Devoniana (after the Duke of Devonshire) were also sent by him and named in 1842. It is unnecessary to give a list of the species found by the SCHOMBURGK brothers, and we will therefore only mention the genus Schomburgkia as having been named in their honour. It may be as well however to mention the mistakes they made in recording the species of Cattleya found at Roraima. C. pumila and C. Mossiæ are both recorded, yet no one has discovered either of these in the neighbourhood, the Cattleya growing there being a species distinct from Mossiæ, hardly deserving to be called pumila, (dwarf) lately named C. Lawrenciana from Sir TREVOR LAWRENCE, an enthusiastic *orchidophile*.

Before leaving the early period we may mention a few other commemorative names. Cyrtopodium Andersonii was introduced into England as early as 1804, and named after Mr. ALEXANDER ANDERSON, Superintendent of the Botanic Gardens at St. Vincent, who visited Guiana in 1791 and collected plants. Rodriguezia was named in honour of EMANUEL RODRIGUEZ a Spanish physician and botanist, Brassavola from ANTONIO MUSA BRASAVOLA, an Italian botanist born at Ferrara in 1500, Stanhopea, from PHILIP HENRY, 4th Earl of Stanhope, Lockhartia (Fernandesia) from DAVID LOCKHART, Superintendent of the Botanic Gardens, Trinidad, from 1818 to 1846, Cyrtopera Woodfordii from Sir RALPH WOODFORD, Governor of Trinidad, Maxillaria Henchemanni from HENCHEMANN a plant collector, Selenipedium Lindley-

anum from LINDLEY, the great botanist, Galeandra Baueri from BAUER, the coadjutor of HOOKER, and QUEKETTIA from a well-known microscopist.

It will be seen from these examples what a wealth of interest there must be in names that sometimes puzzle the ladies. We are continually being asked for common names of orchids as well as other plants, and cannot help remarking that as a rule botanical names are as easy to pronounce as those of the people they commemorate. After SCHOMBURGK'S time few additions were made to the list of Guiana orchids, until SANDER of St. Alban's sent collectors. Certain species, such as Cattleya superba and Oncidium Lanceanum, were exported in considerable numbers, but no novelties turned up until Mr. BURKE went to Roraima, and brought Zygopetalon Burkei. It appears that he also found a Cattleya which he was unsuccessful in taking alive to England; and this induced Mr. SANDER to send out another collector named SEIDEL in 1884, who brought back what was afterwards named Cattleya Lawrenciana. Other expeditions followed, by which several novelties were introduced, and these, with the additions made by Mr. IM THURN, have again brought British Guiana to the notice of collectors. Unfortunately, during the last few years, absurd restrictions have hampered collectors in such a way, that the last who went to Roraima thought his employers would probably never send out here again, but rather let their collectors go by way of Venezuela. This is certainly undesirable—instead of putting obstacles in the way the Government should rather offer every facility. As for denuding the forest of rare orchids this is virtually impossible, as long as the trees remain. Nature's own

barriers will prevent their extinction until the Guiana timbers are appreciated, and then the poor orchids will be ruthlessly destroyed without giving pleasure to any one.

2.—CULTIVATION IN GEORGETOWN.

As but little has been written about the cultivation of orchids in tropical climates the result of some twenty years' experience may perhaps be useful. When we arrived in Demerara, the conditions necessary for their proper culture were entirely unknown to us, and, although we had seen many collections under glass in England, it took some time, and entailed many losses before anything like a system could be formulated. At that time as at present there were some beautiful specimens of Oncidium Lanceanum, Oncidium altissimum and Cattleya superba, growing on trees beside the streets, but these represented, as we discovered later, a meagre "survival of the fittest." Thousands of orchids were brought to Georgetown, only to linger for a month or two and then die. They were placed under almost every condition but the right one, with the sad result that few or none survived the long dry season. When not placed on trees they were often put into wire baskets with rotten wood, and hung in galleries or other unsuitable places, exposed to the sun and wind. When they were seen to suffer from such treatment, the opposite course of putting them under the dense shade of trees and creepers, was pursued with equally disastrous results. It has naturally followed that these interesting and beautiful plants have been almost left alone, no one caring to take a lot of trouble and then see their pets die.

But, after all, the difficulty is more apparent than real. When it is considered that epiphytes live almost entirely

on moisture gathered from the air, and thrive only where there are no winds to dessicate them, the most suitable conditions can at once be formulated. These are, protection from the sea breezes, and damp surroundings. Given a good screen to windward, light protection overhead and continual moist exhalations from beneath, we have all that is necessary. No matter whether the plants are fastened to living trees, mounted on logs or shingles, or planted in baskets with burnt earth, charcoal, crocks—even with no filling material whatever—they can always be grown when the surroundings are favourable.

However, although this general statement is applicable to every species, there are great differences between them. The conditions under which, for example, Huntleya violacea and Zygopetalon rostratum flourish, beside the creeks or falls, are impossible to imitate without some special arrangement, and therefore they can never be grown in the open garden. A fair collection can nevertheless be made by any one having a high hedge to windward and a few suitable trees inside this screen. Although this tree has not hitherto been used for such a purpose we believe the very best for epiphytes is the Saman. Planted in the middle of a garden and allowed to grow naturally, its lower branches hang nearly to the ground, so that they be easily utilised. Then, the foliage is not too dense, as may be seen from the fact that it does not prevent grass and other plants growing underneath. This reminds us that such a character is a very good indication of the conditions necessary for growing orchids successfully on trees. Whenever the shade entirely prevents undergrowth it is too dense for orchids, as may be seen in the forest where the banks of the

creeks, the Mourie and the mountain slope, are their favourite haunts. After the Saman come the Flamboyant, calabash, custard-apple and its allies, with all others that allow sufficient light to penetrate. As a rule such trees as the mango, tamarind and star-apple, are unsuitable, although when kept well trimmed they may be utilised for some species. It is always of advantage to have the plants rather low, as they can be observed so much easier, and in such a position they are better protected against the wind.

On trees, the most suitable orchids are undoubtedly the two species of Oncidium (Lanceanum and altissimum) and Cattleya superba. These flourish under conditions most unfavourable to other species and will even endure a fair sea breeze, although they undoubtedly succeed better without it. After them come others, in something like the following order, the most difficult to grow being nearest the end of the list :—

Brassia Lanceana	Rodriguezia secunda
„ Lawrenciana	Burlingtonia candida
„ verrucosa	Stanhopea eburnea
Epidendron ciliare	Catasetum tridentatum
Gongora atropurpurea	Brassavola angustata
Scuticaria Steelii	Ionopsis utricularioides

These give no trouble whatever once they are placed on a suitable tree, but go on flowering year after year, and every season become better established. It will be well however that they get an occasional spraying with the hose or syringe, especially on the under sides of the leaves, as they are subject to the attacks of several insects which can be often removed by such treatment. It is also desirable to water the soil underneath in dry

weather so that a moist atmosphere may be produced by evaporation. The great advantage also of growing plants underneath can easily be understood when it is considered that every leaf is continually at work distilling vapour which rises to help feed the orchids.

If such a collection is interesting, how much more so is that of the orchid house. We have seen already that some species cannot be grown at all without such protection, while others thrive much better if brought inside. However careful we may be to keep off the wind there will be always alternations of deluge and almost arid dryness. These extremes are always undesirable even when not fatal, and various methods have been adopted to prevent their effects. The simplest is the latticed arbour covered with climbing plants, inside which the orchids, having been mounted on boards or placed in baskets, are hung. This has one very great disadvantage; it is almost impossible to keep the covering at all uniform. The creepers become more and more dense and require continual and skilful trimming to prevent their shutting out the light. Then, they harbour cockroaches and other vermin which often play sad havoc with the tender aerial roots. Some climbers again have their foliage too broad; others grow so fast as to require continual attention, while the slow growers take a long time before they afford sufficient protection. Taken altogether therefore the arbour is beset with difficulties, and we must choose another sort of house.

A very simple and cheap structure is the shed covered with cocoanut leaves. This is an improvement on the first, and if boarded up at the sides answers fairly well, although it is also open to the objection of harbouring

vermin, and is somewhat unsightly. A better house again is that which is boarded at the sides, covered on the top with wire netting on which scrim canvass is laid. Here every Guiana orchid can be grown, and with a little attention to syringing the air will be kept always damp and in the best condition for the health of the plants. After all however, there is nothing equal to the glass house. True, we do not require boilers and hot water pipes, but the greenhouse is as useful in the tropics as in the old country. It is only in such a structure that protection is secured against the myriads of insect pests which are continually on the look out for tender aerial roots and flower buds. Then again it is in such a structure that the light can be properly regulated and uniform dampness secured at all times, entirely regardless of what the weather may be outside. Further, many plants which could not possibly be grown under other conditions in Georgetown, here flourish to perfection. Ferns and selaginellas overrun the stages if left alone, and fibrous peat and sphagnum moss may be used for the orchids as they are in England. We have had in the glass house beautiful curtains of pitcher plants (Nepenthes) stretching along three sides and such maidenhair ferns as are never seen otherwise. Then, such delicate orchids as Vanda cærulea, Phalænopsis, Zygopetalon and Aganisia pulchella flower freely and never get burnt at the edges of their petals.

Such a greenhouse can be built of any shape or size, and may be as simple or ornate as the pocket will allow. The only difference between its management and that of such an erection in cold climates (besides the heating apparatus) is the shading. We have tried a light film of white paint on the glass, but this is not so useful as a

shading of scrim canvass on wire netting. By stretching this about two feet above the glass, free circulation of the heated air is always obtained, and if the ventilation of the house is effected by leaving slits immediately underneath the glass roof the temperature inside is never excessive.

In the forest, the air is kept damp by continual exhalations from the foliage, and this condition may be imitated in the orchid house by having stages covered with ferns beneath the hanging baskets. Nothing in the way of watering with the syringe, hose or garden engine, can produce such an effect as the constant distillation carried on by such banks of plants. Then, the condition of the ferns and mosses is always a good indicator of the sufficiency or otherwise of the amount of moisture, as the least sign of curling at the tips shows the want of water. It is of the greatest importance to many species that they should never become dry, and although some are better for a rest after flowering, even these can hardly endure the arid conditions of the height of the dry season in Georgetown.

In regard to mounting and receptacles, these are of little consequence as compared with the surroundings. Boards, logs and baskets of greenheart, are equally admissible, as well as pots and even wire baskets. Attention must be paid to drainage where pots are used, as orchids cannot endure stagnant water about their aerial roots. The best filling material is burnt earth; this retains moisture for a longer period than anything else and is always congenial to the plants. Avoid everything that savours of decay, whether the dry rot of wood or the sourness of cocoanut husks. Only in a close house,

where the moisture is always uniform, is fibrous peat admissible, as alternate wetting and drying produce conditions that are very unfavourable. The aerial roots turn away from anything they dislike; the plant will rather loose its hold and fall to the ground than remain attached to wood which has begun to decay. Even where we can see no signs of this the behaviour of the plant is a sure indicator of its commencement.

Anyone who travels in the forest may see that the process of decomposition which goes on there is quite distinct from that on the coast. Great trees crumble down into a rich brown humus, with but little sourness or fungus growth. True, the white threads of what appears to be one kind of mould are common enough, but those yellow, grey and black fungi so common about our palings and other out-door woodwork are wanting. It follows therefore, that although orchids may thrive amid the decaying leaves that lodge in the tree-forks of the forest, they cannot endure the dry rot of the coast. Alternate wet and dry as compared with almost uniform moisture seems to be the cause of these great differences, which are well exemplified by the dark coffee-coloured water of the pegass savannahs when contrasted with that of the stagnant pool, which is yellow or green and lies on a bed of stinking black mud.

3.—WHAT ORCHIDS ARE.

Before enumerating the Guiana species it would be well to define what is an orchid. At an exhibition in Georgetown some years ago, a common species of bromelia was exhibited under the name of a "parrersite" and the person who showed it was quite indignant that no prize was given for his "orchid." This is an illustra-

tion of the vulgar notions of these plants; "an orchid is a parasite, *ergo* all parasites are orchids." The distinction between a plant which fattens on the juices of its host and one that simply sits upon a tree, is not recognised, and then, few know that the orchid family contains terrestrial as well as epiphytal species, but that none are truly parasitical. Epiphytes, as their name, denotes, are tree perchers, but not vegetable leeches like those monsters, the bird-vines (Loranthaceæ).

Epiphytes are by no means peculiar to the orchid family, nor are all orchids epiphytes; we must therefore look out for some other definition. They can hardly be described as shrubs or trees, although some of the Sobralias grow into thickets and have almost woody stems. They are not strictly herbaceous plants, as the vanilla is a tall climber, nor can they be classed as bulbous although many terrestrial species have tubers; we are therefore unable to lay down anything definite from their habit or general character. Even when we come to some of the peculiarities of certain families these are by no means general. The pair of tubers from which the name orchis is derived belong only to a few species, and the pseudo-bulb of the epiphyte is by no means universal. Some are leafless; they vary in size from almost microscopic dwarfs to great giants twelve feet or more high; some resemble small palms and bamboos; they have leaves thin as tissue paper or thick as sole leather, broad as the hand or cylindrical like whip-cord; and altogether perhaps vary as much in habit as in everything else. On their particular line they are undoubtedly the highest development; nature has run riot with them. They have got to the top of the tree, metaphorically as

well as actually, and are extremely well fitted for their position. If we were asked what quality fits a man best for the struggle which is continually going on in the world we should mention endurance. This is highly developed in the orchid family, and one of the most general characters of the plant is its storehouse against, not a rainy day, but a drought. Endurance is often the result of thrift; without its store of honey the bee could not live during the winter, and even hibernating animals live on the fat they accumulate beforehand. The great nations of Europe have been mainly developed by the practice of thrift; they were able to endure because they stored corn against the winter. If they had simply lived from hand to mouth as the tropical savage has been doing for ages, no doubt a great deal of their capacity would be wanting. Orchids have their times of trouble as we have, and have learnt to provide against them in the best possible way. But even here their versatility is most conspicuous; the same end is produced by different means. On the chalk down and mountain a store of food is laid up in the tubers or thick fleshy roots; on the sand-reef monster green pseudo-bulbs, sometimes a yard long, make ample provision; and on rocks or trees various forms and sizes of pseudo-bulbs and thick leaves answer the same purpose. Where the pseudo-bulbs are large the leaves are thin, and *vice versa*, while with the thickest leaves these are entirely wanting. The vanilla has thick leaves and fleshy stems and when pseudo-bulb or stem are both wanting, the store-houses are the thick aërial roots. Only a few species, living in places that are always damp, make no special provision against drought, and these are but exceptions that prove the rule.

When we come to the flowers we begin to get an inkling of the definition of the orchid. The labellum or lip is peculiar and generally most conspicuous, but this is not universally the case, a few genera having it of small size and hidden within the other divisions. However, it is always present in one shape or another and is generally more or less united with the column. Linnæus put the Orchidaceæ in his class Gynandria, on account of the union of the male and female organs into one body, and this column, as it is now called, is the essential and peculiar character of the orchid. The more advanced botanists place the Orchidaceæ at the head of the natural orders of Endogens and the Compositæ above the rest of the Exogens. Both are examples of fusion of certain parts—the Compositæ have their florets aggregated and anthers united, and the Orchidaceæ their stamens and pistils incorporated the one with the other. The orchids are therefore to this respect not only above all their allies, such as the lilies, but farther advanced than any order of Exogens. That they really are so, every student must admit, as in variety of form, colour, habit and contrivance they certainly excel all others.

The place that these wonderful plants have taken during the last few years is therefore only due to their merits. In them we have epitomised all the powers and capacities of plants. They are the kings of the floral world—the most delicate, the most sensitive, the most curious and the most varied. Like men they are individuals—every plant is so different from every other that an *orchidophile* may recognise each one. Some species have scores of named varieties, but this is nothing; every single plant is a variety. It follows therefore that

the interest of a collection never ceases, its owner soon begins to look on each individual as a friend and watches for the blooming of a stranger with enthusiasm. As if ordinary variations were not enough the genus Catasetum has taken upon itself to change the shape and size of its flowers in a way that is most bewildering. Of the three forms it seems to have the power of choice, so that it may produce one now, another at its next flowering season, and later again the third. On this account the species are somewhat confused, and there is work for a close observer to examine into the differences, and observe the conditions under which these appear.

There are peculiarities in the seeds of orchids that make them also well worth studying, but as these papers are not intended to deal with anything beyond the most obvious points, we shall leave these things to the student. Our object is to call attention to the beauty and variety of the orchids found in British Guiana, and to give a list of species so that they can be recognised by others than botanists. As we shall use very few technical terms a glossary will not be needed. Anyone who has seen a few plants will easily recognise the pseudo-bulb; the labellum or lip can be seen in every flower, and the aerial roots are also distinguishable without difficulty. We shall use the term pseudo-bulb for the swollen stems of Cattleya and Epidendron, although these differ somewhat from the storehouses of lateral flowering genera, aud may mention that some botanists call all these aërial tubers. The transition from pseudo-bulbs to fleshy stems is so very gradual that it will be sometimes a little difficult to draw the line, but practically this will cause little trouble. Certain genera contain epiphytal as well as ter-

restrial species and these will be properly distinguished.

4.—WHERE THEY ARE FOUND.

Nearly three hundred species are found in British Guiana, and they are distributed everywhere throughout the forest region except in the densest portion. All along the banks of the rivers and creeks, on the sand-reefs, and especially on the mountain slopes, they flourish on the trees, the sand, the rocks and even on the ground. Generally speaking, particular species are peculiar to certain localities, but they have the power of accommodation to a certain extent. Thus, those of the mountains will flourish on low gnarled trees or on the ground, quite indifferently, and those of the Mourie on low bushes or fallen trunks and branches above the sand. In the genus Catasetum we have one species growing below the crown of the eta palm, others on branches just above the ground or water of the creek, while one kind is very common growing in the sand itself. Even a single species will sometimes accommodate itself to different circumstances, and become much altered in size and general habit by the change. One of the best examples of this is the Epidendron nocturnum, which is so widely diffused as to be found in West Africa as well as Tropical America. Some of the varieties are weedy in appearance and have a marvellous power of endurance, while others have quite handsome foliage of a ruddy brown colour and grow to four times the size. When it is perched high up on the tree and in full sunlight its leaves are narrow and its stem four to six inches high, but on the Mourie we have seen it rise above the sand to an altitude of fully a yard. A stranger to the colony will perhaps think that because we say orchids are plenti-

ful, therefore they can be easily collected. This however is a mistake; as a rule an ordinary traveller hardly sees more than two or three species, and these only when they are pointed out to him. All along the great rivers, banks of foliage slope down into the water and prevent the branches being seen, of course hiding whatever is perched upon them. When stopping at some house, a few Rodriguezias and other small species may be seen on the calabash trees, or perhaps an orchid which has been placed on one of them by the owner; otherwise the visitor sees nothing and concludes that these plants are very rare indeed. Let him paddle up an open creek with an intelligent native however, and the case is different. When he understands what is wanted, the Indian sees the plants from a distance where the stranger cannot discern them even when close to his eyes, while the skilled collector can load his bateau with certain species in an hour or two, where others find nothing.

The foliage is so dense, and the assemblage of epiphytes of various kinds so crowded, that the orchids are often obscured by great arums and bromelias when they are perched on leaning tree-trunks and great branches. Here is a great mass of Oncidium altissimum lodged in the midst of a tangle of bush-ropes. Except when flowering it is hardly visible and might be passed a hundred times without notice. Farther on, a tree hangs its branches almost down into the water like a veil and effectually hides its orchid-laden branches. Then, some species are hidden far up in the tree-tops where they can only be seen from particular standpoints and by the trained eye. As the sportsman sees a bird where it is practically in-

visible to others, so the orchid hunter detects a clump of Oncidium Lanceanum far overhead. We have heard persons—even those well acquainted with the bush—say there are no orchids in their neighbourhood. They know the haunts of the birds, monkeys and rodents, and are able to find them, but not those of the orchids. They may pass through the eta swamp fishing or shooting but never notice the streamer-like leaves of Catasetum longifolium, although almost every palm has several plants flourishing just below its canopy. They can see the indications of a shoal of fish or a flock of birds, but the swamp is only to them a green expanse dotted with palms. Again, the forest strikes them as monotonous; there is nothing but dense banks of foliage along the rivers and dull arcades of tree-trunks beyond. Even the botanist has to get accustomed to the bewildering variety of trees, bushes and epiphytes, before he can distinguish one from another, and find out the most likely places for particular plants.

There is a fascination about a creek journey which far exceeds the more quiet rowing along small rivers in other climes. To the stranger everything is so novel—the dark water, dense shadows, grandeur of the foliage, height of the trees and the obvious struggle of everything for its share of sunlight, all combine to produce an impression which is never lost. If the traveller is an orchid hunter he will be able to recall a particular bend of a creek where on a leaning trunk he first came upon the beautiful Stanhopea eburnea. Stretching across, just above his head, the stem was only clear of epiphytes immediately underneath, while the upper edge was clothed with a dense assemblage of bromelias, arums and ferns, apparently trying to push each other into the

creek. The orchids had apparently retreated, and there on the edge were Stanhopeas, Gongoras and Brassias, all more or less hanging over, their flowers depending so as to be free from the smothering crowd above. Farther up the same creek, where hardly a ray of direct sunlight could penetrate, he was rewarded with the sight of Zygopetalon rostratum in full bloom, and in a more open place went into ecstacies at seeing Coryanthes macrantha hanging from a tangle of bush ropes.

Passing up the great rivers, where nothing is visible but sloping walls of foliage, the orchid hunter will never see a single species unless he pushes his bateau behind the veil. Perhaps the dome of a low tree slopes right into the water, and the intricate branches are almost impenetrable. However, a few slashes of the cutlass makes an opening, through which his craft enters, with a result that amply rewards him for his trouble. Every branch and almost every twig is covered with most delicate and tiny ferns, Peperomias and orchids, some of which are particularly interesting although so inconspicuous. They are mostly species of Pleurothallis and allied genera, plants unknown to the ordinary collector and somewhat difficult to grow.

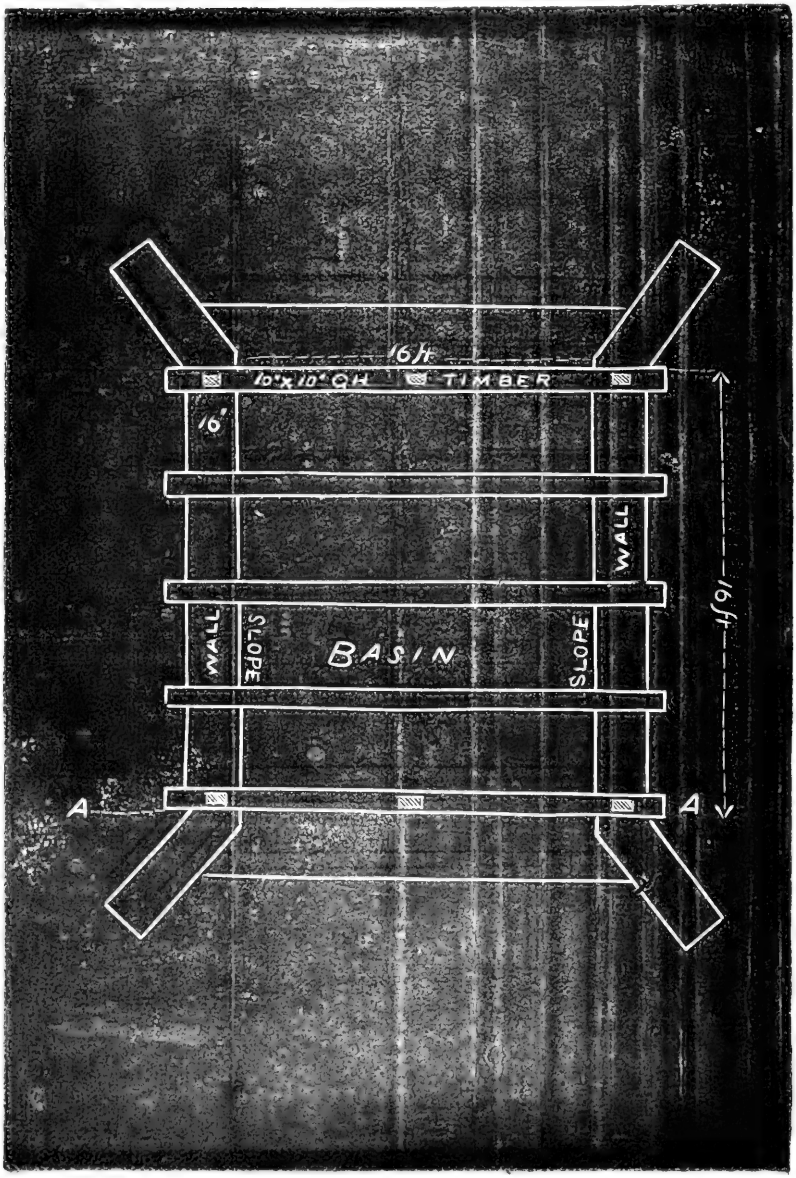
Beside the creek where it winds through the swamp, the low gnarled trees and bushes are often loaded with commoner orchids such as Brassavola angustata and Epidendron nocturnum, many of them exposed to direct sunlight, which they are able to endure because there is nearly always a wide stretch of water below. Catasetums are also plentiful in such places, their fat pseudobulbs and great capsules showing that the conditions are particularly favourable. In fact, many orchids delight in

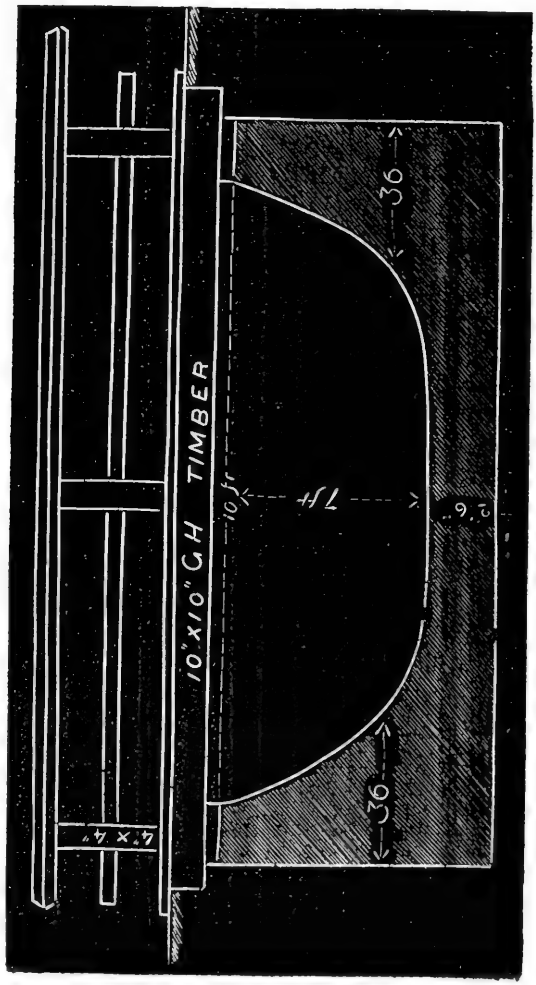
the open when the surrounding atmosphere is damp, and virtually do without shading altogether, especially those that store food against a drought in great pseudo-bulbs. On the sand-reef we have the perfection of food storage in the Cyrtopodiums, which have pseudo-bulbs over a yard in height. No matter that the sand is burning hot underfoot during the day, it cools very quickly after sunset, and is then overhung by a mist from which the orchids can easily gather moisture. Even in the swamp the beautiful Cleistes rosea, almost as large and quite as beautiful as some of the Cattleyas, grows to perfection, with several Habenarias and other less showy species.

However, as we said before, orchids are not easily found, nor when seen, procurable without difficulty. Not to mention the impossibility of climbing one of the forest giants to procure Oncidium Lanceanum, or a tall Eta for Catasetum longifolium, there are difficulties in collecting those within reach. Many provide shelter for garrisons of ferocious ants which come out in myriads as the plant is touched. Sometimes they are so interlaced with bush-ropes that they can only be procured by chopping above and beneath while enduring the attacks of their gallant defenders. We cannot but admire the way these little creatures run along the blade of our cutlass and up our sleeves, although their painful bites are anything but agreeable. Sometimes scorpions, centipedes and tarantulas are hidden in their masses of aërial roots, and these are of course more disagreeable, although, unlike the ants, they never advance to attack their disturbers. Even snakes (generally harmless species) will startle the collector by dropping into his bateau.

To be continued.

PLAN OF BRIDGE SHEWING CONCRETE WALLS AND





SECTION OF BRIDGE.

coarser and has more lime in it, but this shell is difficult to obtain owing to the very heavy sea that generally prevails in that quarter. During the present year I have tried the experiment of making up a small piece of road under my charge with Barbados marl or lime-stone, over a layer of broken granite, and there is no doubt that it is an improvement on the burnt earth and shell, although more costly. There are several pieces of road that of late years have been covered with shell only, and in dry weather they are very pleasant to travel over, but with the heavy rains they will not stand the traffic of heavily laden carts, and get cut up very soon. The average cost of maintaining the roads of the colony now under Government control has been $1.31 per rood during the last year, but it is only by constant supervision and unremitting care on the part of the officers in charge of the different districts that this has been accomplished. Twenty years ago the roads of the colony were a by-word, they could not be called roads, but more rightly quagmires. However, during the regime of the late Chief Commissary, Mr. W. S. TURNER, things were changed and I have no hesitation in saying that the Government-maintained roads will compare favourably with any roads in the West Indies. I have before mentioned the cost of the upkeep per rood of road for the past year, but that of course is the result of the system of using burnt-earth, with shell as a top covering. There are some roads however on which there is a very heavy traffic, viz: "The Best," the East Coast up to Buxton, and the New Amsterdam, from the town to Pln. *Port Mourant;* these roads as a rule cost more than any others, those of New Amsterdam princi-

pally from the want of drainage. It must be patent to any one, that with roads such as ours,—unless they are well drained,—where the rainfall is not allowed to cover the parapets, there is very little difficulty in keeping them in order, except on those where the water is allowed to rise on the parapets in some places to within 6 or 8 inches of the crown of the road, and remain there for weeks, as is notably the case on the East Coast Berbice. In such cases it is absolutely necessary to be constantly working on them, as the water percolates through the clay, and consequently the hard substance as fast as it is put on sinks out of sight, making it necessary during the dry weather to secure a good crust on these roads by a free application of burnt-earth and shell so as to enable them to bear the strain of the traffic during the rainy season. The cost of preparing burnt-earth for our roads varies considerably; in some parts of the colony, where wood is conveniently near and there is no cultivation to interfere with the burning near the road, the earth can be prepared at from 40c. to 60c. per cubic yard, but in other places where the wood has to be transported long distances it costs $1.20, $1.50, and sometimes as much as $2.00 per cubic yard; the average cost all over the colony for last year was 84c. per cubic yard. Shell also varies in price; that procured on the coast at "Bel Air, "Buxton," and other places costing about 56c., but that purchased from the Waini River and Berbice Coast from 80c. to 90c. per cubic yard. The experiment alluded to before of using Barbados marl over a granite foundation, is rather costly, the marl being $2.00 and the flint or granite $1.68 per ton. I calculate that with this material the cost of covering a rood of road is as near as possible $3.00, but I have no doubt that with better

facilities for landing this marl it would be reduced to $2.00 per rood, and there is little doubt but that it will out-last two coverings of burnt-earth and shell. There is great difficulty experienced in some districts of the colony in preparing burnt-earth; the clay is not always suitable, possibly has too much sand, and when burnt and put on the roads becomes powdered to dust in a few days. There is also a great difference in the quantity of burnt-earth obtained from a cord of wood in the different districts, in some you with difficulty obtain 2 or 2½ cubic yards, in others, where the wood and earth are good and the weather favourable, as much as 5 or even 7 cubic yards are obtained. I once in an exceptional instance on the Corentyne obtained between 8½ and 9 cubic yards to the cord of wood, but this was with specially selected wood, with suitable earth, and a very favorable season. Could this quantity always be obtained the cost of the up-keep of the roads would be very much reduced. I average the quantity of burnt-earth to be obtained from a cord of ordinary wood at 3 cubic yards.

The bridges in this colony also require mention while on the subject of roads, as the one is part and parcel of the other. They are constructed mostly of wood, piles being driven at either end, caps placed on these, their beams laid on the caps, and the flooring on the beams, with the addition of handrails as a means of protection to vehicular and other traffic; this old style of bridge was a very primitive structure and is fast going out of use, being replaced by those now erected on concrete walls in place of piles and in a good many places with iron superstructures. The late Mr. TURNER imported 7 of the latter, four are erected in Essequibo,

viz: at "Queenstown," Maria's Lodge, "Adventure," and "Hibernia," and in Berbice one has been erected at "Belladrum" and another at "Whim." One remains still in hand and is intended for the Gibraltar sideline, to complete the drainage scheme of the Fyrish block, as it is called. These bridges cost landed here £49.10.0, or $237.60 each, and the erection $680, including transportation from Georgetown to the spot on which it is placed. The cost of a wooden bridge of the old style is from $300 to $350 and in some parts of the colony $500 or more, and the cost of the iron on concrete basements are, on an average, $950. The latter will last a life time, with no other expense than a coat of paint occasionally, the former requires renewing every 4 or 5 years, with repairs at intervals. The iron bridges in Essequibo are I have no doubt well-known to the president of this Society, and I am inclined to believe, that if questioned, he will admit that they have been erected in a workmanlike manner, have every appearance of lasting for many years to come, and are a credit to the colony. I beg to lay over with this paper a rough sketch of our iron bridges on concrete walls as erected by the Commissary's Department.

*A Few Popular Facts about Diffusion.**

By Llewellyn Jones, Engineer, Plantation Nonpareil.

I HAVE undertaken to place before you "A few popular facts about Diffusion; with special reference to its present position in Demerara."

Mr. DUNCAN, in his interesting and suggestive inaugural address, called your attention to the Society's records of the past, reminding you that many valuable and instructive papers are stored for reference, relating to a large variety of subjects connected with the progress and prosperity of this colony; and this reminds me that this is not the first time that the subject of "Diffusion" has been brought before your notice as a Society.

In 1885, a paper advocating this process was read by Mr. MATTHEY; and in July, 1887, Mr. HOGG delivered a lecture on the same subject, with special reference to Aska. In January of the same year Mr. NEVILE LUBBOCK gave a forecast of the possibilities of Diffusion, and in 1890, he also contributed an interesting article to *Timehri,* embodying a comparison between double-crushing and Diffusion.

Nevertheless, gentlemen, I think there is yet room for further contributions towards the consideration of this important process, and I feel that I ought to be able to read my paper to you this afternoon without danger of incurring the charges of plagiarism or redundancy.

My predecessors have had chiefly to content themselves with a recital of results obtained in foreign coun-

* Read before the March meeting of the Society.

tries; with forecasts as to what would probably eventuate in this colony; or with hypothetical comparisons of the various methods of sugar extraction in vogue in British Guiana.

Now, Mr. LUBBOCK, in treading on such uncertain ground, has himself cautioned you as to the usually deceptive character of paper calculations, and from this point of view alone, I hope to find room for my remarks to-day; for whereas others have prophesied, I trust to be able to show in what manner their prophesies have been fulfilled; where they have only been in a position to indulge in theory, I purpose to deal with actual practice and its accompanying results.

It should add to the interest attached to the present paper if I remind you that our experiences had for the most part to be encountered, and our difficulties overcome, by our own unaided efforts. There was no treading in the footsteps of other experimenters. By virtue of circumstances we were in a great measure necessarily left to our own resources, and perhaps it is best so to be left. Whilst there is safety in a multitude of councillors, it has also to be remembered that "too many cooks spoil the broth." As in the fable, so in everyday business matters, if you listen too much to outsiders you will never get over the bridge. You will be unduly swayed this way by reports from Louisiana; you will be drawn aside that way by accounts from the Sandwich Islands; and you will find yourself dumbfoundered by "facts" from Java.

Now gentlemen, I do not wish for a moment to detract from the full value of operations in foreign countries. Far from it. I only earnestly wish we could, to our own

local advantage, add those enjoyed by Java, plus those specially characteristic of the Sandwich Islands, and so on; and then I have no doubt we should be able to score results that would make a record.

All suggestions and general information that can be gleaned from external sources should of course receive the fullest and most careful consideration, and herein will lie the safety and wisdom to be derived from a multitude of councillors; but the decision as to how far these suggestions should be adopted, and in what manner they ought to be carried out, lies undoubtedly with ourselves, lest a plethora of cooks should spoil the feast. In the long run such a course will be found to be the sound path to be followed. What is one Estate's meat, is another Estate's poison. A policy that would bring forth good results on Plantation Hampton Court in the extreme West, might cause disappointment if pursued on Plantation Skeldon in the extreme East of the colony; for even within the limits of Demerara we find widely varying conditions. For instance, our coal consumption at Nonpareil was felt to be excessive when compared with results obtained in Java and the Sandwich Islands; and we felt greatly discredited. But when one of our principal critics on this score had visited Demerara and made himself acquainted with details of the conditions under which we had to work at Nonpareil itself, he unreservedly withdrew any stigma he had unintentionally cast upon us. Another gentleman from the same quarter expressed surprise when, to use his own words, he found that in various methods we had originated we could give the Islanders "points." A third visitor, who had travelled in Java and Australia, and who keeps himself in

constant touch with all sugar-growing countries, said that from what he had seen and heard of other colonies, and taking into consideration the conditions under which we laboured at Nonpareil, we were at least quite equal to, if not in advance of most Diffusion Factories. What I wish the members of this Society to realize this afternoon is the fact that this new process of Diffusion is systematically working in their midst, crop after crop; and that standing as a process, by itself, it is a commercial success.

Let us now turn our attention for a few moments to the earlier expectations that were entertained by the various writers connected with this Colony, who from time to time referred at intervals to the possibilities of diffusion.

1stly. It was supposed that the capital already invested in Cane Mills would be absolutely wasted; while at the same time further capital must necessarily be sunk in the purchase of the new diffusion machinery proper.

2ndly. That the time-honoured and convenient custom of unloading canes out of punts on to cane-carriers must be abandoned, and much extra handling of the canes incurred.

3rdly. That great annoyance, inconvenience, and loss of time would probably be experienced in readily maintaining the efficiency of the Cane Slicing Machinery, especially with reference to the sharpening and changing of the Cutter Knives.

4thly. That the ordinary supply of Estates' trench-water as obtained from the Conservancies would not suffice either as to quality or possibly as to quantity, for use at the Diffusion Battery.

5thly. That after the canes had been sliced and treated in the Diffusion Battery, the exhausted slices would be altogether lost as useful fuel.

6thly. That these useless slices, so far from proving good fuel, like megass, would present themselves as a serious and ever-increasing accumulation of objectionable rubbish, which would have to be got rid of in some way or other, at considerable cost.

7thly. That possibly, as a partial mitigation of the above nuisance, they might be found just about capable, with trifling assistance, of ridding themselves out of the way by a sort of self-destruction process in a modified Rubbish Destructor.

8thly. That probably a further alleviation might be sought by the manufacture of these waste-slices either into paper or "paper-stuff."

I mention these points as standing somewhat together on the one hand in a class by themselves. They were the problematical points that practical experience and effort alone could solve. Around them much intelligent and earnest speculation and investigation necessarily centred, and a large majority of the questions involved could not fail to excite, and most certainly did attract the interest and close attention of all connected with the staple industry of the Colony, and I shall presently endeavour to give you some brief explanation of the ultimate solution of some of these problems, so far as they have been dealt with up to date.

On the other hand there was another group of objections to diffusion which had obviously to be reckoned with in the adoption of the new process; they were tangible factors in the *pros* and *cons* of the profit and loss account due to a larger extraction of sugar from the canes.

1stly. There is a large increase in evaporation to be dealt with, due to the new method of extracting the increased amount of sugar from the canes, involving a greater consumption of fuel.

2ndly. There is an increase of labour in the work of the factory to be provided for.

3rdly. There must be an increased provision of packages for the larger quantity of sugar to be sent to market, coupled with the increased cost of transit both in and out of the colony.

4thly. There is increased interest and depreciation to be allowed for, due to the increased capital laid out.

Now these two batches of "points," as I may term them, do not exhaust the questions associated with the successful working of the diffusion process. There is a third class of problems not yet fully solved, and the final solution of which should add much in the near future to the advantages to be gained by the adoption of diffusion. They may be briefly stated as follows :—

1stly. The best style of slicing machinery to be adopted; combining the best form of slice suitable for the purposes of diffusion pure and simple, together with the most convenient method of handling the canes.

2ndly. The best method of preparing the exhausted cane slices for fuel; whether by double or single crushing; whether by two or three roller mills..

3rdly. The most important and altogether unsettled question concerning the proper and complete clarification of diffusion juice.

I think, gentlemen, I may now say that I have enumerated all the "burning" topics connected with diffusion, and that the minor questions not touched upon are such as are related to extraction by the aid of mills equally with diffusion, and therefore call for no notice in the paper I am reading to you to-day.

I have so far taken it for granted that you are all more or less acquainted with the main principles of diffusion, but perhaps I ought at once to imitate some of my predecessors, and apologize to you for once more endeavouring briefly to define and explain the new process, which, by the way, I notice Mr. MATTHEY eulogizes as "this rational and scientific system."

Diffusion has been known for very many years as occupying an active position in nature and various persons have made frequent efforts to apply this natural principle, as illustrated in Laboratory experi-

ments, to the process of extracting sugar from the cane; for the simple reason that by its adoption a purer juice in larger quantities, ought to be obtained through its agency. Most processes for extracting the juice from the cane have depended for success upon the more or less complete *rupture* of the cells containing the juice, as is the case when mills are used; and the diffusion process differs from them essentially in dispensing with *sheer force* and in endeavouring to substitute the *natural law of Osmosis*.

Allow me very briefly to explain the action of "Diffusion," "Osmosis," or "Dialysis."

If a porcelain cylinder, open at both ends, be taken, and parchment covers be firmly tied over these ends, and the cylinder thus prepared be completety immersed in a basin of circulating water, so that there can be no communication between the water surrounding the cylinder and the interior of the latter, save through the porous parchment membranes; and if into this jar with its parchment covers, you have previously placed a dissolved mixture of gum-arabic and sugar, it will be found in due time that all the sugar will have diffused through the parchment into the water surrounding the cylinder, the gum at the same time being almost altogether left in the jar. Thus, as with this experimental jar, so also with the cane-slices in a Diffusion Factory, we ought to be able to procure from the canes a juice composed chiefly of water and sugar, the more objectionable matters being left behind in the exhausted slices.

The constituents of sugar-cane-juice, and their proportions, are well-known, and may be classed under two distinct groups :—*(a)* "Crystalloids," including the sugar

itself and the other salts which are capable of assuming a crystalline form:—*(b)* "Colloids," embracing the gummy or mucilaginous matters which are not capable of crystallization.

In cane-juice, these two classes of bodies exist in most intimate association in the cells of the cane-plant, and they are distinguished by a remarkable physical fact, which forms the basis of all modifications of the diffusion process. This fact is the difference which they manifest with regard to the power of passing through moist water-tight membranes. The crystalloids, when dissolved in water, will readily pass through vegetable and animal membranes, when there is water in circulation on the outside; the colloids are not possessed of that property to nearly the same extent; and thus, as I have already said, by the immersion of the cane-slices in circulating water, as in the diffusion process, we ought to be able to procure a juice much purer than that obtained by the aid of mills; for the dead cell-walls of the cane-slices form an excellent dialyser, and the sugar should pass on to manufacture, while the gummy matters remain within the cells. A greater extraction of sugar from the cane is likewise obtainable through the application of this natural law, than by brute force.

The practice of the diffusion-process may be described as follows:—The cane-slices are brought into contact with the ordinary estate's trench-water. Then, by theory, if the cells in the cane-slices contain 12 o/o of sucrose, transfusion will go on till an equal weight of water contains 6 o/o of sugar, while by the passage of water into the cell, the juice therein is reduced to the same density as that of the exterior solution. Taking

this 6 o/o solution, and with it treating fresh slices containing again 12 o/o sucrose, a 9 o/o solution will be attained, which on being brought a third time in contact with fresh slices would be raised to a density of 10·5 o/o, and so on.

In working the process, ranges of from 14 to 16 cells, called the Diffusion Batteries, are in use at Nonpareil; 10 or 14 cells being in operatiou, while the others are being emptied, cleaned and re-filled. These cells are termed Diffusors, and consist of large, close, upright cylinders, capable of holding each about 36 to 40 cwts. of sliced canes. They are provided with inlets and outlets, and pipes for inter-communication, so that the fluid contents of any one cell can be forced by pressure into any other. The cells measure twelve-and-a-half feet in total depth of contents, by four feet aud three inches diameter. And, I may here mention that much larger cells than these are now in use in Cuba and the Sandwich Islands, which are capable of holding two-and-a-half to three tons of cane-slices.

The added water of Diffusion is run from an elevated tank into No. 1 Diffusor, which contains the slices almost exhausted of their soluble saccharine contents. It percolates the entire mass, and by pressure passes onwards into No. 2 Diffusor, where it again acts on slices somewhat richer in juice. So it goes through the series of cells, acquiring a greater density in its progress, and meeting in each successive cylinder, slices increasingly rich in juice; and under the combined influence of heat and pressure, the juice within the last diffusor, containing fresh cane-slices, becomes richly charged with sugar. A draught of about 400 gallons of diffusion-juice is now

withdrawn from this cell, and passes on to the clarifiers to be dealt with in the usual course, and to be manufactured into sugar. No. 1 cylinder, or diffusor, when exhausted, is disconnected; No. 2 then becoming No. 1, and a newly charged diffusor is joined on at the other extremity of the range of cells; and so the operation goes on continuously day and night.

The above cells are arranged in a circle in each battery and are situated upstairs in a lofty building. They are readily filled with cane-slices by a travelling shoot, which pivots on the centre column of the battery. There is therefore neither delay, confusion, nor excess of labour in this respect; and three elevators of admirable construction, bring up the chips from the slicing machines below to the travelling shoots, which fill the diffusors. We can now go downstairs to the large concrete tank, whence these elevators start, and within which the cane-slicing machinery is situated. This tank is formed of some 300 tons of concrete, and has a displacement of about 150 tons. It stands like an island, surrounded by the water of the mill-dock, and is connected to the main buildings by a bridge. Four cane-slicing machines, with horizontal cutting discs, fitted with twelve adjustable and easily-removed knives, fed by six angled hoppers, providing a multiple feed for feeding in the canes are placed at regular distances apart within the tank; and as the canes are sliced, the slices fall into the elevators already mentioned, and go up to the batteries.

Modern and efficient slicing-machines can now be obtained which dispense with many complications, and they can be fed with a cane-carrier, precisely as with mills, and without extra labour or supervision.

When the cane-slices have become exhausted of their saccharine contents they are composed of woody matter, water, and slight traces of sugar and other substances, in the proportion of 90·3 o/o water, associated with 8·7 o/o woody matter; and they are discharged from the bottom outlet-doors of the diffusors on to a horizontal circular turn-table, placed a little above the ground-line of the battery. Like the shoot upstairs, this turn-table also revolves around the centre-column of the battery, and automatically transfers the exhausted slices from any point of the battery circle to a chip-carrier, which in turn transports them direct to the old cane-mill, where they are squeezed as dry as possible, for the purpose of turning them into good furnace-fuel.

Now, gentlemen, I think I have described to you as fully as is possible in such a paper as this, the theory and actual practice of diffusion, and you will notice that the old cane-crushing mill is not laid aside as useless, but is utilized as a chip-squeezer and dryer, and I must here mention the undoubted fact that by this means the exhausted slices are turned into excellent furnace fuel. It is extremely fortunate that, contrary to general expectation, the exhausted slices have really proved such valuable fuel. I doubt very much if they could ever have been profitably utilized in any other manner, and I feel I cannot too strongly emphasize the great success that has attended our efforts in this direction. When I hear or read of people calmly discrediting their value in this respect I cannot help feeling extremely sorry that so much incredulity should exist with reference to this matter.

We have six coal boilers at Nonpareil. Their

average total heating surface is about 820 square feet per boiler. For every pound of coal we burn, we evaporate 8·53 lbs. water from and at 212 deg. Fahr. to mean gauge pressure, and the average horse power of each of these coal boilers is 54 h.p. on the basis of one cubic foot of water evaporated per hour.

We use generally the same number of chip boilers (viz: six) every day. Their average total heating surface is about 1,083 square feet per boiler, and the average horse power of each chip boiler is 75.7 h.p. on the basis of one cubic foot of water evaporated per hour.

From the above figures (even if we only get chips enough for five chip boilers, which is sometimes the case) you can readily see that while our coal used does only 47 o/o of the work, our chips do 53 o/o of the total work of the Diffusion Factory. These figures are very significant, and can be left to speak for themselves.

If you attempt to make paper-stuff out of exhausted slices, or megass, in order to make such manufacture pay, you must produce a good quality of "stuff," such as will fetch good market prices; and the latter at the very outset demand a length of fibre of at least half an inch in length. This requirement appears altogether incompatible with a good diffusion-slice barely one-sixteenth of an inch thick, and at once shuts the door on this expected outlet, independently of several other serious objections, which for want of time cannot even be touched upon in this paper. In dealing with this special question I am speaking from considerable experience, having been in charge of experiments made in this colony with a view to making paper out of double-crushed megass.

In the case of the old process you have, we will say,

irrespective of size, a single cane mill, giving an extraction of 63 o/o juice on the weight of canes. The canes themselves pass through the mill; the juice going to the clarifiers on the one hand, and the megass straight to the furnaces, on the other. You adopt diffusion in this Factory. Then you will add to your existing mill, the slicing machinery and a battery capable of dealing with the same quantity of canes per 24 hours as formerly, and you will then obtain an extraction of say at the very least 83 per cent juice on the weight of the canes. You will of course, at the same time, also have to increase the capabilities of your evaporating plant and add to your steam-boiler power. In the case of mills you will probably have worked from 16 to 17 hours per day; with diffusion you will run continuously night and day, and an electric lighting plant or its equivalent will be indispensable in the latter case. From the increased extraction, apparently fully 31 per cent more than formerly, you will obtain fully 27 per cent more sugar from a given weight of canes than you used to get through the agency of mills. This difference between the extraction of juice and the sugar actually produced will no doubt greatly diminish when proper clarification has been secured in connection with diffusion juice. But it is the increase of sugar obtained that must be taken into the fullest consideration, for this is the figure that determines the actual profit that will accrue from the adoption of diffusion. At the same time I must remind you that with careful work it is quite possible to obtain an extraction of 85 per cent juice on the weight of canes with the new process. By the time the diffusion juice is in the clarifiers, and the exhausted slices ready for firing on

the furnace platform, you will, *on equal weights of canes*, have expended as nearly as possible about the same engine power as would have been required up to this stage of manufacture with mills and their lesser extraction, the still greater expected saving in engine-power, originally anticipated with diffusion, not having been altogether realized; partly because canes are much tougher articles to deal with than beet-roots; and partly because the use of the old cane mill is continued in the new process for the preparation of the exhausted slices as useful fuel, an expenditure of power that is more than fully compensated for. If the hydraulic attachment is used in connection with this mill, it should be applied to the megass roller in preference to the top roller, as the former application will not only give squeezed chips 7 per cent to 8 per cent dryer than would otherwise be the case, but will avoid other objectionable risks that cannot be dealt with in the present paper. Of course the application of hydraulic pressure to the top roller of a two-roller mill is the correct thing, and is much more convenient than any other arrangement. But personally I am totally opposed to the application of any such pressure to the top roller of a three-roller mill; and unless it is weighted so as to remain absolutely quiescent, save under the occurrence of strains dangerous to the safety of the machinery, I firmly believe such application to be one of the greatest blunders ever perpetrated in this colony.

On every hundred tons canes, you will in the case of diffusion obtain about 30 tons chip-fuel, against 37 tons megass with the single mill; but owing to improved furnaces, and the special conditions under which the chips

are obtained as fuel, you will find that pound for pound these diffusion chips are quite as good, if not better fuel than the single crushed megass used to be. These chips are associated with about 56 per cent. to 58 per cent moisture when they enter the furnaces, and often have a temperature of 107 degrees Fahr., but their average temperature appears to be about 96 degrees Fahr., whilst the temperature of the heated air admitted to the furnace grates, for the purposes of combustion, may be set down as fully 170 degrees Fahr. These figures partly account for the great value of the chips as fuel, their average efficiency being 1·76 lbs. water evaporated per pound chip fuel from and at 212 degrees Fahr. to mean gauge pressure, and there have been several very carefully conducted Boiler Tests where this efficiency has been as high 1·9 lbs. water per pound of chip fuel. These figures seem high; but the recent adoption of a Beck's Water Meter, which works and measures the water continuously day and night, as it is actually used in the daily work of the Factory, has confirmed the accuracy of some twenty special boiler tests that have been conducted at Nonpareil. We will say, however, that practically, you will in effect, with diffusion, get about 20 per cent less chip fuel for your megass boilers, on equal weights of canes, than would have been the case when using the single mill as a juice extractor. In addition to this loss in original fuel, you will, with diffusion, have to cope with the increased evaporation due to the greater extraction of juice, and the added water of diffusion, which has caused dilution of the original cane-juice, and through the agency of which you have obtained the increased extraction of sugar from the canes. Let us for a moment

enquire what this dilution means. If to 100 tons original cane-juice, as obtained from the canes by the use of mills, you add 30 tons water, you will have effected a dilution of 30 o/o. In other words this is what is meant by the expression "30 o/o dilution." This dilution is an ample allowance for all the requirements of the new process, and on the average, should never be exceeded over the entire work of a crop. Practical sugar makers will find that such a dilution has virtually lowered the density of the original cane juice 2 deg. Beaumé. Whereas with mills, they would have found juice standing at 10 deg. Beaumé in the clarifiers, it will, with diffusion, only stand at 8 deg. Beaumé. Although only 30 o/o water has been added to the original juice, it means that about 37 o/o more water has to be got rid of by evaporation in the course of manufacturing the diffusion-juice into sugar, than would have been the case with *equal quantities of mill juice*, and were you only working 16 or 17 hours per day, as formerly, your evaporating plant would, on the score of dilution alone (in the case of equal quantities of juice) have to be made capable of doing 37 o/o more work than formerly. As you are supposed to be dealing with *equal quantities of canes*, there is the increased extraction of original juice, as well as its accompanying dilution, to be reckoned with, and were it not for the fact that you work continuously night and day with diffusion, the increase in the power of the evaporating plant would, to be really economically efficient, have to be about 80 o/o. Fortunately, the continuous work of diffusion comes here to our aid, and the above complications may be summed up by saying that if your dilution is 30 o/o and you increase the efficiency of your evapo-

rating plant by about the same percentage, it will be theoretically sufficient, on the average, to meet the requirements of the particular case now under consideration; but owing to the variation in the amount of the dilution, during an entire crop, and the undoubted advantage of having an evaporation rather in excess of the average work, it would be prudent, and I believe would pay, to make this increase of power up to 50 o/o more than it used to be.

Though the continuous work of diffusion throughout the 24 hours, helps us in the matter of evaporation and in reducing the number of additional coal boilers required, it unfortunately does not favourably affect the fuel account—multiple effect evaporators alone can assist us in this respect; and this increased fuel question can be best practically stated as follows—I speak from actual Demerara records:

In a well-arranged and well-balanced modern sugar factory, where single crushing is the order of the day, and where no rum is manufactured, you should be well able comfortably to make sugar without the use of any coal or wood whatever, save to start and close the grinding. With diffusion at work in the same factory, after the required modifications and additions have been made, you should not require more than 10 cwts. of coal per ton of 1st sugars made. At Nonpareil, over a crop of nearly 4,000 tons of 1st sugars, our coal account was 13·8 cwts. coal per ton of 1st sugars made, and 12·8 cwts. coal per ton 1st and 2nd sugars taken together, all coal having been carefully weighed before use, throughout the crop. As we are handicapped on this estate by heterogenous amalgamations, and various

drawbacks which would not exist in a well-arranged and newly laid-out modern factory, I consider that the foregoing allowance of 10 cwts. coal per ton of 1st sugars to be excessive, rather than the reverse, and should with good work and management be considerably reduced below that figure; and careful theoretical calculations, based on the data and details of actual work, go to show that in Demerara the coal account, under favourable circumstances, should not, with diffusion, exceed 8 cwts. coal per ton 1st sugars made. This coal would be expended, in conjunction with the chip fuel, about as follows, viz., 40 per cent. would be used up in establishing and maintaining the juice throughout the entire factory at a temperature of 212 deg. Fahr.; 38 per cent. would be used in concentration from juice at 212 deg. Fahr. to sugar; 5 per cent. would be debited against the manufacture of molasses sugar, and the remainder, 17 per cent., would be absorbed by the various engines throughout the factory.

The Diffusion Labour account, so far as the Factory alone is concerned, would be increased from about $2·50 with mills, to about $4 per ton 1st sugars made—but in reference to this labour question it must be distinctly borne in mind, that though the actual Factory expenses stand in the above ratio, still if the cost of manufacture, transportation, and cane-cutting be taken together, the scale turns decidedly in favour of Diffusion. The field and other expenses, whether calculated on the sugar or cane, are of course all in favour of diffusion. A certain sum has to be spent on the cultivation, cane-cutting, transportation and establishment expenses, whatever process of extraction may be in use at the Factory; and

the larger the quantity of sugar obtained from a given weight of canes, by so much the cheaper will be the constant expenditure per ton sugar manufactured.

Before diffusion was fairly established much apprehension was entertained in reference to the water-supply question. But these fears have vanished along with a good many others connected with the new process, now that experience has shown that an abundant supply can always be obtained from the condensers of the various evaporating apparatus. Neither does it appear to matter much whether the water is pure, dirty, or sour, or even somewhat contaminated with lees. In December, 1888, the water supply on the various Demerara estates was about as short as it ever has been; Nonpareil, was no exception to the general rule, and the new process was very severely tested with reference to every possible drawback to which it could possibly be subjected by such a state of affairs, but the results obtained were nevertheless excellent, and none of the provisions that had been made for the purification of the water were ever brought into use. They were not wanted even with absolutely stinking water. In such a drought as is now referred to, when the Water Conservancy scheme was of no avail, and the estates' trenches were rapidly drying up, it was not possible to throw away a drop of the affected water, either from the condensers, or from the exhausted slices after squeezing. This was all therefore returned to the navigation trenches, and used over and over again for some weeks, without any perceptible injury to the results obtained by the process of diffusion. When the water smelt very badly,

or was sour, or the canes were rotten, a little milk of lime was used on the battery with excellent effect.

In connection with this water question I should mention that just previous to the letting out of the exhausted slices from the battery, on to the turn-table, they are finally cleared as much as possible of all sweet water, by the application of compressed air, which lessens the dilution and avoids the waste of both fresh and sweet water; and drives all sweet water that can be driven, from the cell about to be emptied, into the working portion of the battery, instead of throwing it on to the ground. Loss of time, water, and saccharine, is thus reduced to a minimum, and this air is supplied at a pressure of from 20 to 30 lbs. per square inch, from a compressed air receiver, which is kept well-filled, ready for use at a moment's notice, through the agency of a patent air-compressor, which also occupies a position in Europe as one of the standard vacuum pumps of Germany. As a rule, on the Continent, water is used instead of air, but the latter is now being rapidly adopted. The Nonpareil batteries are also fitted with electrical control apparatus, which automatically record the twenty-four-hours' proceedings on a bulletin, and the diffusors have also each got an automatic air and steam-release apparatus, which ensures the complete immersion of the cane slices in liquor. The batteries are supplied with Thermometers, Water Pressure Gauges, and various steam, air, water and juice and outlet-valves, involving something like 3,000 manipulations in 24 hours. But, notwithstanding apparent complexities, the work is soon understood, and performed with every facility, by the

same class of work-people who were formerly employed with mill-work.

The Nonpareil Diffusion Machinery proper may be briefly summed up as follows:—

4 Cane Slicing Machines, with shafting, gearing, knives, and knife-boxes complete.

3 Stotz's Elevators.

1 Double Steam Engine.

2 Large Circular Diffusion Batteries, comprising 30 cells, 30 juice heaters, with valves and piping complete, supported on columns and girders, together with hoppers and travelling shoots for filling the cells with chips; and other special fittings.

2 Automatic Turn-Table Schnitzel Removers with drag-carrier from battery to mill.

1 High Level Force Pump, with High Level Tank for water supply to the batteries.

2 Air-Compressors, with receiver.

With regard to the expectation that annoyance, inconvenience and loss of time would probably be experienced in sharpening the Slicing Knives, I have to say that it is simply a question of a little extra labour, apart altogether from the running of the Slicing Machines, and an entire set of knives can be replaced in about two or three minutes.

Now, gentlemen, I must not weary you, nor exceed the reasonable limits of a purely popular and non-scientific paper such as this is intended to be. At the same time I must remind yon that the conclusions I have placed before you are practical, and so far as I know thoroughly reliable—and I trust they may be useful to anyone endeavouring to establish a comparison for himself between Single, Double, or Triple Crushing and Diffusion.

In the light of my own experiences, were I an

estate's proprietor erecting a new factory I should most certainly establish diffusion in preference to either Single or Double Crushing. In the latter case even if the extraction with mills be steadily maintained at 74 o/o throughout the crop, which is most unlikely, diffusion, with less effort, can give you fully 14 o/o better extraction. Average double crushing, in this colony, over a large crop, tends to an average extraction much nearer 68 o/o than 74 o/o—and a further benefit gained with diffusion lies in the fact that with dry, sweet canes, it tells to greatest advantage.

In 1890, we made a triple range of experiments, as follows:—On the 25th and 26th April, canes were sliced, and the chips so obtained, ground by double crushing, without the intervention of diffusion, so as to see whether the slicing of the canes previous to crushing would promote a greater extraction of juice with mills. On the 28th, 29th, and 30th of April, and 1st, 2nd, and 3rd May, a run of diffusion, pure and simple, was made without a hitch; and on the 5th and 6th May, a trial was made of the old-time system of double-crushing with two powerful cane-mills.

The extraction from 100 parts canes was:—

Milling Chips.	Diffusion.	Double Crushing.
59·4 o/o	84·96 o/o	74 o/o

The extraction from 100 parts juice, at 12 o/o fibre was:—

67·5 o/o	96·54 o/o	88·10 o/o

The loss in the megass or chips, *i.e.*, loss of sugar was:—

23·54 o/o	3·45 o/o	17·40 o/o

Although the above trial gave with double crushing the high extraction of 74 per cent. juice on the weight

of the canes: in ordinary work, over a crop of say some 4,000 tons 1st sugars, the same mills gave an average extraction of only 68·5 per cent. juice on the weight of canes, and I am of opinion that it is much easier to keep the extraction up to the mark with diffusion, than with any number of mills. The quality of diffusion work is always open to immediate examination, and a falling-off in good results can be stopped at once, and good work promptly re-established without checking the work of the factory. With mills this is not the case.

I feel sure I should also adopt diffusion in preference to Triple Crushing; but I trust Mr. President, that before your term of office has expired, you may be able to arrange for a paper to be read in reference to Triple Extraction, by one of our Colonial experts in this method, so that the comparative merits of such a system may be better understood.

Now, gentlemen, in conclusion I have, as briefly as possible, to touch upon another question, and in doing so am treading on dangerous ground, and am laying myself open to the charge of trying to deal with details somewhat out of the range of my professional experiences. But this matter should not be passed over in silence, and I regret there is no time to deal with it more fully than can be the case to-day.

Is it a fact, that, in accordance with theory, we are now getting, in actual practice, as pure a juice by Diffusion as we possibly imagine we are securing? Is it juice, which though it may be purer, is at the same time similar to or totally different from mill juice? Are our present methods of clarification correct? or ought we to seek to substitute a more suitable agent than lime, and cease to

follow in the old-time rut of the customary clarification of mill-juice? I am inclined to think, from all I see and hear, that in Demerara we are scarcely on the borderland, even, of any scientific investigation of these questions; and I have very grave doubts whether many if any of us know what we are talking about, when we speak of "Diffusion Juice." The latter almost always *looks* better than mill juice. It is clearer. It is almost absolutely free from mechanical impurities held in suspension, and no blanket is formed on the top of the juice as it stands in the clarifiers.

But as in the moral and social, so also in the sugar-making world, we all need to be cautioned not to judge altogether by appearances. I fear that in actual practice there is but little doubt that the perfect theory of diffusion does not have complete effect. To secure the latter, the chips, if possible, ought to be retained in the diffusors, between two parchment diaphragms, or their equivalent; and Dr. HARCOURT, of Oxford, holds this opinion. I am inclined to think "Maceration" would be quite as correct a term for the new process as "Diffusion" for as a matter of fact, it is a combination of these two methods. A very considerable proportion of the Cane Cells are cut into, and bruised during the operation of slicing, and therefore liberate their juices mechanically, together with an excess of their impurities, which would not be the case with diffusion pure and simple. In other words, as a matter of practice, and actual fact, a very large and unknown percentage of the intrinsic advantages of theoretical Diffusion are most probably lost to us by the extensive cutting open of the cells by the cane slicing knives.

Again the maintenance of high temperatures throughout the battery, so desirable for rapidity and thoroughness of extraction, for the preservation of the juice in the battery, and for the advantageous use of the exhausted slices as fuel, tends still further to complicate matters.

I do not wish to praise diffusion one moment, and find fault with it the next. Far from it. I simply wish to be explicit, and to place things, if possible, in their true light. Moreover, diffusion, as now practised in Demerara, is an excellent process, and I only wish to see it placed in a still better position than it has ever occupied, by ridding it of some of its present drawbacks. Many people, not acquainted with the ins and outs of our practical difficulties, might be tempted to think that undue prominence is being given to this question. But I don't think so, for I have a strong impression that this is one of our chief troubles, and should not be ignored; and I firmly believe it is at the bottom of many practical inconsistencies in the working of the process, which cause great loss and annoyance and can only be got rid of by a thorough analysis and final settlement of this question, and I trust, Mr. Chairman, I am not overstepping the mark in suggesting that your influence as President of this Society might obtain for us a paper from Dr. STUBBS and his professional associates in Louisiana, on this subject, to be read either by yourself or the Secretary at a future meeting, before the close of the year.

The case may be very briefly stated as follows: The organic solids, not sugars, in mill and diffusion juice comprise two main classes; *(a)* nitrogenous bodies, that have usually been accepted altogether as albumi-

noids; and *(b)* non-nitrogenous bodies, usually termed "gums."

The nitrogenous bodies found in mill juice form 1·3 o/o of the total solids, not sugar, in the juice. Of these nitrogenous bodies 35 o/o are albuminoids and 65 per cent. non-albuminoids. In the case of diffusion juice, obtained from a battery worked with cold water the nitrogenous bodies are 1·4 o/o of the total solids, not sugar, in the juice, only 24·5 o/o of which are albuminoids and 75·5 o/o non-albuminoids.

In the case of Diffusion juice, again, when the battery is worked merely at the very moderate temperature of 150 degrees Fahr., the nitrogenous bodies extracted increase to 2·09 o/o of the total solids, not sugar, in the juice. That is 33 o/o more than are extracted with cold water, and 38 o/o more than are found in the mill juice. And of these nitrogenous bodies only 10·9 o/o are albuminoids and 89·1 o/o non-albuminoids. In this last case it seems that the hot water coagulates the albuminoids and causes them to be left behind in the exhausted slices.

These figures are very striking and significant. With immature canes, and increased battery temperatures, they are said to become still more striking and significant, and the usual working temperature of a Demerara Diffusion Battery is 212 degrees Fahr. One thing seems to be certain, diffusion and mill juices do not behave alike in regard to fermentation, and whereas in the case of mill juice, changes are quickly detected, in diffusion juice they may be concealed, and yet be proceeding. The subject is too important to admit of rash and partially matured remedies, and the first step obviously is to find out the nature of the whole

of these impurities which may be troubling us, and thus there is a wide field open for future investigation. It would seem that Phospho-Tungstic Acid is to be the coming practical clarifier in connection with the aforementioned evils, and as it can be produced cheaply, it is to be hoped it will soon come to our assistance, either in conjunction with lime, or as a substitute for that hitherto indispensable clarifying agent.

Finally, gentlemen, I believe we unduly prejudice diffusion by our inaccurate methods of comparison. We take a Laboratory press or mill and obtain a partial sample of the original juice in the cane, say 75 o/o of the total juice in the cane, whereas to be accurate, this extraction should be absolutely complete. We then polarize this partial sample, and from the result of this polarization proceed to estimate the total sugar in the cane, at 12 o/o fibre. This method is in error and makes the losses in manufacture appear greater than they really are ; the total sugar in the cane sometimes figuring out 3 to 3·5 o/o in excess of the amount actually contained in the cane. With Triple Crushing, reliable samples of juice, in exact accordance with the actual extraction in vogue can be obtained, and their comparisons are thus fairly correct, and their work throughout the Factory appears in its true light, and has the advantage of diffusion in this respect—assuming a comparative superiority to which it is not entitled.

Margarita.

A HEALTH RESORT.

By Dr. J. F. Chittenden, C.M.Z.S., Trinidad.

COOL, dry, salubrious, picturesque, a land overflowing with all the material requirements of human existence, its population industrious, prosperous and most hospitable. Such is the description we commonly get in Trinidad of this most interesting island. On the other hand many will tell you that it is a land of poor fisher folk, with drought, famine and desolation continually staring them in the face, most inaccessible, unfit for human habitation except on the hardest conditions; where the fowls taste of fish, the sheep and goats are but skin and bone, and the only creatures fit to exist are lizards and tumble bugs. Having recently visited the island it occurred to me that a plain and unvarnished description might be useful and possibly interesting to valetudinarians and others in such humid and feverish climates as Trinidad and Demerara, so without further preamble I will ask the reader to go back to the 12th October, 1893, and accompany me from the jetty at Port-of-Spain.

I had a choice of vessels, French and Dutch Packets, and English Cargo Steamers (Tramps). I selected one of the latter (KNOTT'S line) because it possessed the great recommendation that the passage cost half the money and was twice as comfortable as on the great ocean "swells." We weighed anchor at 6 p.m. and

the sensation of the cool sea breeze on passing the Bocas made one feel a profound compassion for those left behind in the reeking atmosphere of Port-of-Spain, the captain remarking "Ah doctor, this breeze will soon chase away your malaria and aching pains." Although the accommodation below was all that could be desired it was rather close, and so the steward kindly made a bed on deck; this gave me a chance of watching the coast line, which is a continuous chain of high mountains and a sure guide to mariners, very different from the East Coast of Trinidad with its sunken rocks and absence of lighthouse, and also from Demerara where the lead-line has to be kept going all night and nothing of the shore can be seen but the tops of palm trees or sugar factory chimneys.

At 5 a.m. we ran into the anchorage of Carupano in company with the French Packet. The first impression of the town was certainly not favourable, although it improves on acquaintance. There is a good *embarcadere* (covered) and plenty of business in shipping cacao and importing dried fish, etc., (principally from Margarita). The fish seem to be the staple food of the agricultural labourers in Venezuela and pack animals are loading up with it all day long for the interior. There is a large Custom House and staff of very polite officers, a shabby looking *Resguardo* or Guard-house with about 20 or 30 young fellows (soldiers) seated on long benches in front, each with a *mauser* rifle in his hand, a uniform cap, shirt and trousers, and barefooted. An officer a little in advance is seated on a cane-bottomed chair, with a sword in a much battered scabbard and a red sash twisted around it in his hand, also with a uniform cap

but plain clothes. These poor boys who serve as police or in the execution of any public or even private work at 20c. a day, are pounced upon on the estates by a kind of press gang when wanted, and are *quite innocent* of the elements of drill or the use of the rifle, which by the way they carry as if it were a hoe, pitch fork or other agricultural implement, frequently shooting themselves or their friends from ignorance; two such casualties happened the day before I arrived (of course there are very differently equipped regiments in Caracas). A line of poor shops, restaurants, etc., was all else that could be seen of Carupano from the sea, but a small tram-car with a little mule was waiting outside the Custom House to convey passengers into the heart of the town, which consists of one long street going inland. At the end of it (one mile and a half) was the place of business of the steamer's agents—a wealthy Corsican House—the seniors residing in Paris. All the trade of the place seems to be in the hands of these keen men of business and wonderfully clannish they are. They have so systematically favoured the French Line that the Royal Mail Steamers decline to stop there any more. At this establishment I observed the very latest and most improved machinery for the preparation of coffee and cocoa. Both merchants' stores and private dwellings present sorry frontages to the street, the latter being provided with iron gratings and heavy shutters instead of windows (taken from the Moors,) but at the back cool corridors extend on each side, enclosing a court yard or *Patio,* as it is called, with flowers and ornamental palms. I noticed several exotics which hailed from the Trinidad Botanic Gardens; and taken

altogether they were cool and pleasant retreats after the hot thoroughfares. Carupano is scarcely worthy of any further notice except that it is as bad as Port-of Spain in respect to street-lighting (with pitch oil), somewhat in advance in sanitary arrangements (dry earth) and worse with regard to water, the precious element having to be carried 3 miles by pack mules. A large sum of money was voted for an aqueduct but it disappeared under the head of "miscellaneous"— not far behind us there.

The next point then for me was to find a vessel bound for Margarita—several small craft lay at anchor, but none seemed likely to leave before Monday. In the meantime, as there was no hotel in the place I was very glad to accept a room from a gentleman to whom I had been introduced. The apartment had the usual heavy doors and iron gratings, dark and something between a cellar and a prison cell in appearance, but after a few articles of furniture had been put in and a hammock slung up, it proved cooler and more comfortable than I anticipated. Breakfast and dinner were obtained at a kind of boarding house opposite; many and varied dishes covered the table, but so extraordinary was the cooking that I thought it could only have been inspired by the demons of nightmares and dyspepsia.*

On Saturday the 14th I was startled by the unexpected hoisting of the main-sail of a little sloop. Some one said it was "*El Correo*" or the post boat, bound for Pampotar in Margarita, distant but 5 miles from my destination, so with the frantic hope of quitting these indigestible shores two days earlier than I expected, I rushed down the hill,

* It is fair to my host to say that I was suffering from dyspepsia already.

and jumped into a little dug-out. Two smart Spanish boys pulled rapidly for the sloop which was dancing on the water with the fresh breeze and shewing plenty of her copper sheathing. She was all but under weigh, the captain gave me a hand on board and after a little persuasion agreed to wait a quarter of an hour, so the boys pulled me ashore again and we soon returned with my baggage and departed with the sanguine expectation of reaching our destination early in the evening.

Dinner was served on the hatchway and it deserves a passing word. Something worse than nightmare or dyspepsia was threatened here, colic, tormina or convulsions must surely be the upshot of this! Red beans stewed with *papellon,* cloves and garlic, concreted slabs of rice and maize flour boiled together, and cold corned fish with chopped raw onions were on the table, but it is fair to say that it was followed by excellent correctives in the shape of fine black coffee and old rum. The shades of evening set in, the breeze died away, the lights of Carupano being still in full view, alas! So there was nothing for it but to make a night of it, with the compass box for a pillow and our legs hanging over the bulwarks. I tried to make the best of it, gazing at the stars and listening to the groaning and creaking of the mast and cordage, and the flapping of the main sail, until the rain came down, and then it was a case of sitting it out with waterproofs etc.

At dawn Margarita was fairly in sight; the mountains, casting off their shadows, were gradually illumined by the rising sun, exquisitely gilded and tinted in every variety of colour. Surely unless it is the old story "that distance lends enchantment to the view" this must be a brighter

place than the money-grubbing town we left behind us? At last there came a faint breeze and we slowly headed towards our destination, sighting Pampotar at midday; in the meantime we all amused ourselves fishing and shooting pelicans. The bay of Pampotar is beautiful, the sea emerald green, and the sands white as snow. A few shabby huts and the *Resguardo* front the sea, with a large white two-storied house, formerly occupied by Dr. FREELAND—who lost money in exploiting phosphates, but eventually cleared out with a large fortune acquired in the exercise of his profession—within which is a collection of red tiled daub and wattle structures and an old Spanish Fort. The only shade perceptible is a cocoanut tree divested of leaves and a thorn tree on the beach! The soil generally is more like a bed of lava than arable land; everything is scorched up! It is necessary to observe however that this melancholy spot is not to be taken into account as a seaport, it has given place to other towns more favourably situated.

On landing (Sunday) I was marched off to the Guard House, bag and baggage, as a suspicious character, but on showing the very polite official the cover of a letter to General ORTEGA he forthwith produced a bottle of fine old rum and cigarettes and slung me up a hammock. Whilst awaiting animals to convey me to Porlamar I saw a number of poor children suffering rather severely from measles, and one woman with cancer of the breast which was being treated by blistering, as the unfortunate woman said, to dry it up or disperse it! The ride (of about 5 miles) from Pampotar to Porlamar the chief sea port, was interesting. After passing some sand dunes and rocky hills, we crossed the Llanos or Plains (savannas).

One is here strongly reminded of South Africa; the same stunted bushes with scanty grass between, and pools of water here and there, fat cattle everywhere, sheep goats and pigs grazing together and making up with the young shoots of the bushes for any shortcomings in respect to the grass. The bushes were mostly thorny with a great deal of divi-divi and other Cæsalpinias. It is rather puzzling to make out how it pays to pick divi-divi pods, weighing so light as they do, and selling only at about £5 a ton. It is done here by the children; how would the interesting little ones at our village schools take to this industry? When in Carupano I noticed a barque lying there which had been chartered to take 100 tons of divi-divi and 200 tons lignum vitæ, from Pampotar. The most interesting feature in my ride was certainly the marvellous collection of birds, of every variety and of the gayest plumage—I never saw so many together out of an aviary. Tropials, humming birds and some in full song—the "*rossignol*" pointed out to me, is probably a troglodyte, but appeared larger than the "*oiseau de bon dieu*" of Trinidad, the song is most melodious and comprises many different notes, but not equal of course to that of the nightingale of Europe.

All along the road we met men and women, probably returning from church, the men well-favoured enough, but the women with a look of inexpressible sadness and premature old age, and wearing ugly cotton handkerchiefs tied under their chins, which added to their mean appearance. If however but little can be said of their personal attractions, their industry is beyond all praise. They may be seen going to market driving heavy-laden donkeys before them, with loads upon their own heads, and

utilising their hands at the same time for knitting. They are about ¾ white and ¼ Indian and possibly such a life of toil combined with their maternal cares is the cause of their early break down. Both men and women are as solemn as Dutchmen but very polite and respectful, none passing without an "*A Dios!*" or "*Salud Senor.*" A few bright eyed young faces with long raven tresses are seen now and then peeping out of the doorways, and one regrets that their charms have but such an ephemeral existence. Late in the afternoon we reached Porlamar. Here is an ugly looking church, a large plaza, or square, with an ornamental fountain in the centre and stunted trees,—"Llaque," a hardwood used for boat building—fairly broad streets, at right angles, very little verdure anywhere, and the same white buildings with red tiled roofs, iron gratings for windows, and an excess of heavy blank walls, but comfortable courtyards with flowers and fountains *inside.* The fact is the Spaniards (and Venezuelans) build their houses on different principles to West Indians; with us the design is to catch all the breeze possible, disregarding the sun and glare—e.g. iron roofs and jalousie doors and windows—the Venezuelans exclude both. The construction of their roofs is worthy of our attention, a layer of *cana brava* (our white roseau) on the rafters, (which may be plastered and whitewashed or not) then 8 or 10 inches of *tapia* or mortar, and finally the red tiles.

Porlamar is probably twice the size of St. Joseph, comprising more business houses, and there is plenty of bustle with the country people coming and going. Two well equipped Pharmacies are conspicuous, and one notes the absence of hams, jams, pickles and

quack medicines, which do not add to the professional character of our leading chemists shops in Port of Spain. The market is held more or less on the beach, under the shade of some thorn trees; carcases hang on the branches, from which the butcher hacks at random (joints are unknown) gorgeous king fish and pague (red fish) none less than 8 or 10 lbs. lie in heaps and are sold for 15 or 20 cents each. The sea is magnificent; as at Pampotar, the anchorage is alive with small coasting craft trading to Barcelona, Cumana, Carupano, Trinidad, etc. In Porlamar good old-time hospitality still reigns, and therefore there are no hotels, although it boasts of a restaurant, billiard room, and soda factory (without ice). I was comfortably installed in the house of Herr ROTTE a German, who like many of his countrymen, has become a Venezuelan in speech and manners, but is nevertheless betrayed by his honest Saxon face and stalwart frame. Thanks to the generosity of my host I started for Asuncion, the ancient capital of the island, the next morning (Monday 16th) with a good mount and the escort of his son. Riding out of the town we passed a long line of buildings, shed built, covered with the usual red tiles, one long roof sloping from the street, mostly open at the back, thieves being supposed only to come in at the front; my escort informed me the houses nearer the town were occupied by a colony of fishermen, those more distant by agriculturists, The country in the direction we were now taking was again quite South African; plains intersected with ridges of mountains, some 4,000 feet in height, the general aspect like Cariacou, but bright green here and there in the valleys and on the cool mountain slopes. A remark-

able oasis of this kind is *El Valle* from whence the water supply of the town is derived, it is a very bright place indeed, with canes, and every description of fruit trees and plenty of water, about 3 miles from Porlamar, but in spite of the generally arid character of the country there comparatively is very little land out of cultivation and you pass fields of plantains carefully fenced in, carefully weeded and planted in lines, as well as *Yucca* or *Manioc* canes everywhere. Distilleries and potteries are all busy, as the earth is of the best quality for pottery. The road was excellent but scarcely wide enough at places for two to ride abreast (there is no wheel traffic in the island) ; like in other parts of Venezuela you have a line of trees (thorn bushes) which affords shelter from the sun and serves also for a fence. After a leisurely ride of about 3 hours, including stoppages at many houses along the road, where my lively companion was always warmly received, he declaring that the *Muchachas* were *hermosisima,* and *muy sympatica*, we entered *Asuncion,* once honoured by the arrogant *Hidalgos* and the flower of the Spanish Army, but now the retreat of a few quaint old-fashioned people and poor tillers of the soil. *Tempora mutantur !* What was KINGSLEY thinking of with his " At last "and the many yachtsmen who hunt out interesting places, not to come here ? for surely it is worthy the pencil of both poet and artist. The town is protected, or was so formerly before the days of modern artillery, by a castle on a low hill overlooking the town, and which, although unoccupied appears intact. There are also the remains of no less than 7 churches, one is the present church of the *Asuncion* a very quaint old-world building with funny porticos, alcoves, turrets

and steps leading up from outside to the belfry. Inside it is symmetrical and substantial, with many altars, the most famous of which is of course that of the miraculous virgin, to whose shrine great pilgrimages are made; her dress is simply *covered* with the richest of pearls. That reminds one that if Margarita is not the Pearl of the Antilles it is the Antille of Pearls (many persons may not be aware that this island is counted as one of the Antilles) and although time and perhaps the elements have depreciated the value of the pearl beds, it is likely that they helped to keep up the Spanish magnificence 200 years ago. Besides the Saints proper there is a sort of miscellaneous collection; it occurred to me that they must have taken shelter here from the abandoned churches, but an intelligent little boy who accompanied me said it was not so, some even were home made; "they made a great show at processions" he said, otherwise they remained, hidden each locked up in his own little cupboard. There was also a very funny organ, I did not think it was intended to play but I found it rolled out good old Gregorian music the next morning at Mass. I regretted much that time did not permit a fuller examination of the many antique brasses and frescoes of this rare old church. Another of the old churches is utilised as a College and the others are most picturesque ruins. Besides the churches there are the ruins of the old Spanish Theatre, Governor's Palace, etc. The streets are narrow and paved, the squares full of fruit trees and in fair order. Bordering the town is a deep ravine with a fine stone bridge and a pretty stream at the bottom, on each side of the stream a fine cultivation of cocoanuts, fruits, bananas etc., with water trickling every

where; from many points the most exquisite sketches might be obtained. The stillness of this strange city and the appearance of ruins everywhere suggests the idea of the living chained to the dead "the prostrate form of old Spain with a degenerate facing of modern life." The place should be earthed over and left alone; it is demoralising! My companion "GULIELMO" told me that it would not do to pass the *Sierras* at night, and then the dreaded *Laguna Salada,* so we must fain put up with the hospitality of a *Posada* or tavern. If the town reminded me of old Spain, the land of DON QUIXOTE, surely the *Posada* quickened the idea—a huge apartment, dim hanging lamps, a group of women cooking at one end and groups of men seated or standing at the other, with the back open to the Court-yard. Our host, a pleasant kindly fellow, soon set before us some excellent home-made sausages, wheaten bread, fresh butter. cheese, sardines, &c., and excellent coffee. After dinner every one played dominoes, chatted and told conundrums, but I observed no one called for liquor-a strange inn truly.—At 10 or 11, hammocks were slung up and we turned in, but to be in the hammocks was one thing, to sleep quite another. When the moon rose it was quite impossible not to picture to oneself the dear old figure of DON QUIXOTE, who had taken the inn for a castle and the Inn-keeper for a Castellan waiting to be dubbed a knight, passing up and down watching his arms lying on the water but (in place of an altar) with lance and shield in hand (following the text.)

"At this time, it happened that one of the carriers wanted to give his mules some water; for which purpose it was necessary to remove DON QUIXOTE'S armour from the cistern; who seeing him advance, exclaimed

with a loud voice, 'O thou, whoscever thou art, rash knight! who approachest the armour of the most valiant adventurer that ever girded sword, beware of what thou dost, and touch it not, unless thou wouldst yield thy life as the forfeit of thy temerity.' The carrier heeded not this admonition (though better would it have been for him if he had), but, seizing hold of the straps, he threw the armour some distance from him; which DON QUIXOTE perceiving, he raised his eyes to heaven, and addressing his thoughts, apparently, to his lady DULCINEA, said: 'Assist me, O lady, to avenge this first insult offered to your vassal's breast; nor let your favour and protection fail me in this first perilous encounter.' Having uttered these and similar ejaculations, he let slip his target, and raising his lance with both hands, he gave the carrier such a stroke upon the head that he fell to the grouud in so grievous a plight that, had the stroke been repeated, there would have been no need of a surgeon. This done, he replaced his armour, and continued his parade with the same tranquility as before."

At daylight these idle fancies were unceremoniously dispelled by the appearance of coffee and the necessity of taking to the road betimes. In the early morning (Tuesday the 16th) we rode out of Asuncion en route for Juan Griego and soon reached the *Sierras,* our animals having gingerly to climb a zigzag path paved with huge solid boulders, dating from the Spanish time. Here new visions of DON QUIXOTE quite overcame one—why should not these *Sierras* be the veritable *Sierra Morena?* They were dry enough, and wild and brown enough; one had but to fancy the gaunt, half naked, but chivalrous form of the old knight with his rosary made from the galls of Cork trees doing penance to the fair DULCINEA DEL TOBOSO.

"Ye lofty trees, with spreading arms
The pride and shelter of the plain;
Ye humbler shrubs and flowr'y charms,
Which here in springing glory reign!
If my complaints your pity move,
Hear the sad story of my love!

While with me here you pass your hours,
Should you grow faded with my cares,
I'll bride you with refreshing showers;
You shall be watered with my tears,
Distant, though present in idea,
I mourn my absent Dulcinea del Toboso."

Reaching the summit of the *Sierra* there was an end to poetic reveries, as the fresh breeze from the Atlantic braced up one's nerves, and the beautiful view of the northern part of the island opened out. Plains, ranchos, cattle, canes, cocoanuts and fruit trees, and generally more verdure than on the southern part of the country. On through a considerable village called Tacarigua, the houses all of the same size and shape, tapia and red tiled, each family owning their little cultivation in the mountains—poor perhaps, but independent and mostly with something put by in a stocking. Two or three distilleries were also here but no rum shops or evidence of drinking as in every agricultural village in the West Indies. Land grabbers don't seem to thrive in this country, although money is worth 40 or 50 per cent! The Venezuelan laws don't favour such gentry. In this rather monotonous and socialistic village there is an excellent school (Escuela Federal No. 46). There are no priestly bickerings about assisted schools etc., as the Government wisely manages everything on one uniform plan. Education is free and compulsory, nor does it seem to make young Venezuela less religious, but then, of course, they are all of one faith. It is curious to pass through towns and villages, everywhere in this country, and not to see loafers and beggars, so common in Trinidad—perhaps the revolutions clear away this scum of the earth? If so, oh for a few revolutions at home. On we

went through Tacarigua where everyone not at work in the fields was busily employing in weaving hammocks or plaiting the little cheap straw hats familiar with us. After a few miles of the same mixed cultivation, tobacco, black-eye peas, canes, etc., we reached *"El Norte"* built on a terrace some height above the sea level, it ranks only as a pueblo or village but has a fine old church in the centre, and good substantial houses, a fine aquaduct, gardens, and fine fruit trees. It is a cool quiet place well suited for persons with shattered nerves and broken health, I was rather surprised at a custom my companion told me was quite *chief*, which was riding into houses and remaining in the saddle talking to the ladies, without dismounting, in what might correspond to the saloon or drawing room with us, but it must be taken into account that the apartments are vast and paved with tiles. I was introduced to the Abbé, who started to address me in French with great volubility, but eventually broke down and resorted to his native tongue. Spanish alone is understood in this country by gentry and peasants alike and it is impossible to get on without understanding it. Continuing our route the roadside was very freely dotted with little wooden crosses; they stand for patriots shot there in the fights of old; every one uncovers in passing. Another feature in this land of the faithful is a well-kept, trim little chapel inviting wayarers to enter and worship a fragment of the Holy Cross presented therein. And now we pass the famous or rather infamous *Laguna Salada*, surely a disgrace to the Island, as a paved causeway might so easily be made; as it is you sink every now and then into mud as black as ink. It was not very bad when we passed.

The country now became pastoral and studded with thorn bushes with wonderfully knotted and gnarled stems; as they are all hard wood they would be valuable to fancy furniture and garden seat manufacturers. We met a party of Generals in *mufti* but wearing purple military caps, also a local doctor, he said he knew me "very much long." Next a gentleman—called a *Curioso!* a Quack Doctor or local Kickapoo. Approaching Juan Griego we enter a long, interminably long street termed *Calle Arismendi* (after a patriot)—round the corner, and a cheerful, bustling and truly picturesque little town is before us. A creek called *La Salina,* like a river, runs through it, crossed by solid stone or concrete bridges (Spanish masons I observed were employed) the streets are narrow and delightfully irregular, the stores and dwellings of the usual Spanish type. An opportunity was afforded me of judging at one glance of the produce by a kind of impromptu market held in the open street. Our old friend moko or jumbi fig was present and also plantains, bananas, sive, tanias, lemons, limes and oranges, avocado, balangene, sugar apples, etc. also capital cakes and white bread, but mainly aripa or johnny cakes made from white maize flour. This little town presents a handsome front to the sea and has quite an "Esplanade," with a handsome water fountain, light house and ornamental trees. The sea view is too lovely to describe—a rugged coast line, rocky islets, sandy white beaches and mountains on mountains. This wild scenery and the distant Testigos (the witnesses) remind one of the early history of the Island, full of romance, the haunts of the Buccaneers—amongst the most renowned being Captain TEAGHE of Testigos, the

Blue Beard of the Antilles. Where did he recruit his wives. Testigos lies N. E. of Margarita and is now uninhabited except by parties of fishermen who visit it from time to time. The anchorage at Juan Griego is alive with shipping; faluchos, sloops, schooners, and fine fishing boats, all owned in the country. There are no absentee proprietors here. The people love their island and are proud of it. The business houses do not differ much from thriving country stores in Trinidad except that their trade is on a rather more extensive scale. I observed piles of cases of Lafitte, Pontet, Cane-Clicquot, etc.; who drinks these I don't know, as in every house I entered water drinking was strictly the order of the day. As the 30 o/o *ad valorem* duty is remitted here perhaps they sell it on the main land? Cement I observed was sold at $5 a barrel retail, print dresses 12c. and 15c. a yard, white pine boards at 10c. a foot, English potatoes 12c. a pound, lager beer 28c. a bottle, meat, either beef, mutton, goat, or pork 10c. a pound, fine fowls 25c. or 30c. each, fish only to be described in the superlative degree, as at Porlamar, at almost nominal value. It is remarkable that no small fish are seen here and perhaps this accounts for the high and superabundant quality of the fisheries. There is no need of a close season as seines and fillettes as used in the Gulf of Paria are unknown. In a few years more if the present system is carried out in Trinidad, Port-of-Spain will have to dispense with fresh fish altogether as an article of diet. Native rum is of course dirt cheap, one cent purchases a glass *á discretion*, but the natives rarely indulge in it except on Feast-days; the canny people sell it down the opposite coast, a rum licence costing $1 20 a month. The thriving little town

of Juan Griego, not probably comprising more than 5,000 inhabitants, is a great reproach to our tumble-down, dusty, thirsty San Fernando. Whilst the great sugar Metropolis can only run a few paltry hydrants for six months in the year, with a scanty supply of water neither fit for cooking nor washing purposes, Juan Griego pays no water rates whatever, and has the finest spring water, conveyed from a distance of 7 miles to the town, the force as pointed out to me in a private yard from a two inch pipe exceeding any that I have seen in ordinary domestic use. At the time of my visit there was evidently a good deal of nervous excitement about the elections; I observed pretty closely the different views expressed; and although many belonged to a different party to the one now in power, yet such has been the distress brought about by the late civil war that for the sake of peace, every one wishes that General CRESPO may continue in power. Even by those who deny his administrative ability, it is admitted that his patriotism and high qualities as a soldier guarantee that so long as he holds the reins of Government the intrigues of malcontents will be of no avail, and industry will resume its steady course, the country being rich enough to pay for any *laches* on the part of his administrative staff, and after all is said and done what do they amount to? Do the peculations of a few officials in the Republic amount to anything like the waste and extravagance of British Crown Colonies? If so where is the Medical Establishment in this or any other Spanish Republic that costs $200,000? With a population of 2,000,000, against 200,000 in Trinidad would you find 10,000 people living at the Government expense in hospitals and other insti-

tutions* (5 per cent of the population) the streets full of loiterers, loafers, and unemployed beggars? The day I returned to Trinidad I found 100 beggars in front of a merchant's store (actually counted). Venezuela is a badly governed country some say but they know better than to allow cranks and dipsomaniacs to disgrace their Courts of Justice, and if they find a *pronunciamento* a quicker remedy to dispose of traitors and incapables than Royal Commissions I don't blame them. I found the law administered in Carupano by a Judge of the Court of first instance with a salary of $60 a month, and a clerk of the peace at $20. So much to their credit then. It shews that apart from political disturbances they prefer attending to their business instead of spending their lives in endless litigation as in Trinidad. If the patient reader has followed me thus far, with my moralising, I will simply add that having breakfasted at the house of a wealthy and hospitable merchant in the town, I reluctantly mounted my animal and returned to Porlamar, where it was necessary to arrive the same evening in order to catch the steamer *Paparo* crossing over to Carupano. Nothing need be said of the rather fatiguing route homewards except perhaps to notice two jolly fellows, arm in arm, in Asuncion. "*Borachones*," exclaimed my companion—certainly they were the first and last that I saw in Venezuela.

We reached Porlamar at 8 p.m. and after a hurried leave-taking and packing up found ourselves on board the little river steamer, the *Paparo*, a mere temporary makeshift and in no way fitted for a rough sea. It was at

* Trinidad actually provides accommodation for something like the above number.

any rate better than running one's chance in a sailing vessel, which takes in times of calm and adverse currents as much as 7 or 8 days; a catastrophe to be avoided by all valetudinarians. We reached Carupano at 5 a.m. October the 20th, and on Friday the 22nd I took passage in the Dutch Mail Packet for Port-of-Spain. The accommodation and the fare is homely and in some respects preferable to the larger boats.

My conclusions, after rather a hurried visit, from a sanitary point of view are:

1. That Margarita is highly suited for chest complaints, and the sequelæ of malarial fever.

2. The mean temperature is higher than Trinidad, but owing to its even character and the absence of humidity lighter clothes can be worn and therefore the heat is not felt.

3. The absence of hotels or houses to rent is a bar at present to any one in ill health; the difficulty of access and the hardship on the route via Carupano should also make the trip to any one not in robust health prohibitory.

4. The bathing is perfect, and there is also splendid fishing and rabbit and wild goat shooting.

5. Food is varied in quality cheap and excellent, the fish being magnificent; oysters are abundant and of fine quality (there is also the chance of finding a pearl).

6. It is said that a line of steamers is to run from La Guayra, to Port-of-Spain, touching at Margarita. This should induce Demerarians and Trinidadians to make a move in the direction of obtaining suitable houses or hotels. The climate is *utterly unlike* and infinitely superior to *Barbados*.

7. The area of Margarita is very considerable. The population was 40,000 at the last census; it is as dry as you could wish, but for those who don't like too much of a good thing there are many cool bright places with running streams and verdure everywhere, such as El Valle, El Norte, and San Juan.

From a commercial point of view I am of the opinion that one of our regular line of steamers should call there; it is not out of their route, and no doubt much of the present export trade which now goes to ports on the Spanish Main would come here, and the exports from Trinidad, already considerable, would increase; the possibility of a large passenger traffic in the future should also be taken into account.

Reflections on the Increase of Town Populations.

By C. E. Macnamara, Diplomate in State Medicine, &c., &c.

TO those who can carry their minds back some forty or fifty years, it seems almost a new phase in education that many of the minor sciences have become so general. Classes of persons now discuss statistics and other dry topics, with a freedom which was quite unknown to the same class of persons half a century ago. Thus we find the question of population, the increase of its numbers, its prospects, resources and even destiny, are all familiar topics for enlarging upon by ordinary journals and such literature as seeks general popularity amongst the class which makes up the majority of the people; whilst the people no longer look upon the statist as a scientific creature, whose mania consists of the compilation of figures, with their percentages and ratios, and the deduction therefrom of theories tending to the consternation if not confusion of the uninitiated. No, all this amongst many other things has changed and now we find that the comprehension of population as regards its number and increase has during the present generation converted itself from being a subject of more or less scientific study, as it once was, to being, as it now is, a matter upon which the general community keeps itself informed, and the information and knowledge obtained probably can be utilized far more to its own ultimate advantage than the same might be in the hands of the statist for scientific purposes alone, and so it comes about that

probably there are few—even school children—at the present day who do not know that out of every thousand persons living at the present epoch only about half as many die annually as did from a similar number say 50 years ago. This, coupled with the natural increase of the community, forms annually a very appreciative addition to the population, and so far such information is most satisfactory. There are however various ways in which such a fact may be considered, and for the present it may be sufficient to allude to one circumstance which is making itself very measurably felt by the present augmented population, and that is the increasing competition for almost standing-room and for the means of an honest and independent existence. The fact of such a struggle if it but leads to the desired goal is in the absolute but a question of sentiment and probably unworthy of a community's consideration—but the effect it has on the majority of those who fall short of the mark is a different matter, and in so far as it injuriously recoils upon the masses becomes worthy of every consideration in our power.

A contributor to a back number of the *Contemporary Review* points out that "one-fourth of the people who attain the age of 65 are compelled to resort to the Relieving Officer for that bare subsistence upon which they linger out their lives." This largely arises from the fact that the younger population is quite unable to assist in supporting the elder, no matter how closely they may be related. The outbidding each other which is going on on all sides leaves a man hardly able to do more than support himself; and should he be married, as too many of these poor men men are, he finds his difficulties in making

ends meet probably much increased and perhaps resorts to such measures as infant insurance, through which his proper affections for his offspring may become strained. Individuals who are in daily intercourse with the poorer classes of the people see hardships increasing instead of growing less, and though the population is not decimated by infectious diseases to the same extent as formerly, still has not this keen struggle its own injurious effect upon the people? and in the increase both in size and number of Hospitals, Work-houses, Lunatic Asylums and Jails there is anything but evidence to be found of the diminution of the effects of such competition. One would like to see the want for these institutions move in an inverse rate to the increase of the people. I have frequently heard it said that the present population, taken as a whole, is not proportionately a more effective and robust one than that which was made up of its ancestors of say 50 years ago, and I believe it may be put forward as something more than a hypothesis, that in a given community at the present day there are more "ailing" than was the case in a similar community formerly. Is it true that the hale, robust and sound aged persons are no more numerous now in proportion than the same were, say 50 years ago? And again is it true that the anœmic and fragile folks, in fact the constitutionally and nervously weak, have increased in proportion? I make no assertion that it is so, such may be all wrong—I hope it is—but undoubtedly there are some circumstances which support the contention of its being a fact. It would take statistics compiled on the physical condition of the living at two remote periods to prove this one way or the other, and such proof is impossible to

demonstrate by such comparison for no such statistics are to be found comprehensive enough to make the result of such enquiry valuable. There is however not the same difficulty in informing oneself as to the reason why these ailments should be more noticeable now than formerly, the reason is that it was this class of fragile folks that made up the higher mortality of former years. Such a class did not live so long then as now, it had hardly time therefore to shew its pale face before it was handed over to the majority; such a class could not survive the struggle for existence plus the effect of unsanitary influences. But now we have it with us, and we may justly hope that as such a class it will not long remain but that with improved surroundings and beneficient social changes it may outlive its present inherent debility.*

It may seem in the face of such bright prospects of the community being of an all round healthy one, somewhat pessimistic on the part of any one to view the question as having any possibly doubtful good effect upon the community itself. But it may be asked, even with a present non-effective element composed of those fragile folks whether in the struggle for a living a penny is as easily gotten to-day as it was some 50 years ago? Is the competition for it less keen? And, when we have earned that same penny does it go further towards life's necessities than it did formerly? It is to be feared that the answer to all this is "a thundering No!" It is quite true that for the fortunate individual who gains employ-

* From a biological point of view there can be no hereditary improvement of such an unfit class, the progressive improvement of the community eliminates such a class; but as the present paper is not a biological one, I have taken the liberty of expressing myself as above.

ment wages may be, and undoubtedly are, higher, but in the face of corresponding increases in general prices save perhaps clothing, tea and sugar, such higher wages are but a relative increase; such a fortunate individual may live better now than he would have done formerly, but the struggle to get into the position and to keep in it when there is greater than it was. This side of the question belongs perhaps more to the economist than to the workers in public health, yet it has an effective aspect which may justly interest such workers, and it is this. With an increase in the effective population there is also as we have seen an increase in the competition to procure the necessities of life, that is, for the major portion which has to seek such thorough work. It is no compensation to consider that for the minor portion which neither toils nor spins such a struggle makes many luxuries easier to procure and the labour of others cheaper to obtain; and in the face of such competition it may be considered what these circumstances will bring about, and on that point there is not much doubt, for the result is to be seen already in the rapidly augmenting communities of our towns, which are the usual resort of the surplus rural population. They cause, and keep up an increase in the exhausted nervous systems of those who have to compete with brain work, whilst the manual workers find themselves pressed more closely on all sides with a result that both classes have their physical condition run down below par and in this way, through their physiological misery, are most susceptible to the very diseases which we find the Public Health Army most actively fighting against. Again, as such competition and conditions of life go on and indeed daily increase, will

nourishing food be easier to procure? Will the temptation to drink become less? Such perhaps are questions more for the legislator than the public health worker still there can be no line of demarcation between these social reformers over the drink question. It is however much to be regretted, as regards these two workers for the public good, that they are not keeping pace together. Sanitary reform is certainly going faster than social reform; the former is galloping whilst the latter crawls! And whilst this continues it is impossible but that preventive medicine in the great good it attempts must be thwarted very much by its limping brother. The immense good the former does and the vast blessings it confers on all classes are to a certain extent negatived by a force of circumstances over which it has no control. The onus of the sorrow and sin occasioned by such competition as we have referred to cannot properly be laid at its door. In referring to infant life assurance a recent number of the *Contemporary Review* (July 1890) had the following from one of its contributors, when relating the moral degradation of some of the poor parents of these poorer children, "they have no patience with the slow ways of death; they know the poor mother's friends, syrups and rat powder and biscuits. In all death-ways they are clever." A temperate and just critic of that assertion might ask, have they not been made so? What other door is being held so wide open for them? But this is not the point, and it becomes more practical for us to consider whether these evils will become less as the people become more? A galloping increase in population and a hesitating limping condition of social reform! The State must realize the fact that there

is a grave responsibility in permitting social reform to stand almost still whilst it urges on the sanitary improvement of the people. To be beneficial the two measures must be synergetic. It is quite right that the people should have pure air, pure water and pure food, but for those who cannot get the money to procure the latter, what does it all mean but that they should not beget infectious diseases to the possible and probable injury of the affluent! Starvation is not contagious, perhaps it would be better for all if it were so, there would be pleasant legislation to obviate it then, instead of measures that make many almost rather die than avail themselves of their cold charity. Yet hunger is as keen in the pure as in the foul air and it becomes of little use to the starvelings to know that their healthy though wasted corpses eventually shall be washed in pure water! To the impatient socialist it may seem in the face of such things that our legislators see the force of urging on the sanitary horse, it brings benefits to them but the social reform one may graze by the wayside! In justice to them we know that they cannot help themselves, but the ignorant and impartial are seldom just. Still, the fact remains that an augmented and healthy hungry population *must* work cheaply. The sanitary reformers are doing their work, it is not for them to pause, but the effect of all their efforts when unaided by a commensurate system of social reform becomes as we have shewn a somewhat self-defeating work. In an earlier part of this paper reference in passing was made to the drink evil, which is regarded by almost every one, even the votaries at its shrine in their sane intervals, as the *fons et origo* of most of the social misery of our working class, but if we lift up the edge of

the curtain which shuts out our view of their domestic life it may too often be seen that improvident marriages are the cause of fully one-half of the drinking that goes on. A man tired and worn out with toil, living with his family in say one or two rooms, can in many instances look upon his home only as a den seething with children, perchance sick or ailing, a poor wife crushed in her comparative youth through child-bearing; health, spirits, temper, all gone, her life hardly less than a burden to her. The man's home becomes in time little else than a burden to him. Is it to be wondered at if eventually they both betake themselves to bask in the garish light of the nearest public house—the devil's palace—and there seek the solace of oblivion in drink? Amongst the great if not the greatest questions of social reform this one of marriage should rank first, and the clergy should help us here. Instead of encouraging early marriages in the light of the married living a life of sanctity, they might bear in mind that like all hypothetical ventures there are at least two issues to this, one of which is the future condition of any parties whom they have the power to influence as regards marriage. And it would not be too much to expect the State to interfere in the following ways:

1st. A man should before marrying, be expected to give some proof that he is in a position socially to support a probable family.

2nd. The State through its Public Health Officers should organise a system of selection as regards the health and general constitution, and even family history, of those persons who desire to commit matrimony.

3rd. The State might take in hand some measure of insuring the lives of married men in a general National

Widows and Orphans Fund, so as to prevent as much as possible destitution in the event of the man's early death.

There is another measure, but one for which the age is not yet ripe and that is the curtailment of families as regards their component numbers, such, in consideration of the mother's health, should be a legitimate and proper matter of instruction to the woman whose fecundity kills herself.

*Late Rainfalls; some of their Effects.**

By James Gillespie, Manager, Plantation Houston.

WHEN our worthy President did me the honour in January last, of asking for a paper to be read before a general meeting of this Society, I think it was not surprising when casting about for a subject my mind should revert to what was then, from a Planter's point of view, the most burning, or rather the most cool question of the day. I refer to the very heavy rainfalls we have been experiencing during the last 5 years, and if you will kindly bear with me for a short time, I shall endeavour to point out some of the difficulties and ill-effects caused thereby, especially on stiff clay soils, to which my remarks will principally apply.

If you will turn to the rainfall table in that valuable book of reference, the British Guiana Directory, you will find that the average fall for 25 years previous to 1889 was 79·25 " and that the mean for the last 5 years was 109·38," a difference in excess for the latter period of 30·13 inches or 38 o/o above the ordinary rainfall.

The largest crop ever made in the colony was in the year 1887 with a fall of 88·63, and somewhere near this figure we may take to be, when evenly distributed, the most suitable rainfall for our sugar crops. I do not think any accurate information as to the yearly crops of sugar is to be obtained; the Blue Books give us the numbers of acres cultivated each year and from the same

* Read before the April Meeting of the Society.

source we can get the quantity of sugar exported, but as very few estates cut off their entire acreage in any year and as on the other hand the hhds. or tons exported do not give sufficiently correct data on which to base statistics seeing much more sugar may remain unshipped at the end of one year than another, it follows that there is no reliable information from this source, and I know of no other that can be laid before you showing how much these 5 years under notice have come short of the average yield. The following figures however, though not to be absolutely relied on, are still of some value, vizt., in 1887, mentioned above as Demerara's best year, with a rainfall of 88·63, the sugar exported shewed an average of 1.95 hhds. per acre cultivated, as against 1879 with 107·91 and 1·39 hhds. per acre; 1890 with 118·45 and 1·47 hhds; the years 1892–93, when the colony's financial year was changed, appear to show an export of 1·66 hhds. per acre cultivated; these figures shew the decided tendency of the yield per acre for decreasing when the rainfall is much above the normal.

It is well-known that the evil effects of continuous heavy rains are far more apparent in stiff clay soils than on rich porous land, such as is to be seen at the back of East Coast estates and elsewhere in the colony, and it is in proportion as individual estates have more or less of the former in cultivation that they do comparatively ill or well in such times as we have had lately. In former years we used to expect two dry and two wet seasons inside every 12 months, the former being from the middle of February to the beginning of May and the latter from the middle of August to middle of November; the wet seasons occupying the remaining months. Now-a-days,

although the dry weather at the end of the year has never been known to fail, the same can by no means be said about the other or spring dry season, in fact its entire absence has been quite common lately and in its stead we have had simply a continuation of the heavy rains which began at the end of November and often did not stop until the later dry season began, and no doubt this want of a dry season was the most hurtful feature in these five years. It seems to be absolutely necessary that we should have alternating wet and dry seasons, and the want of either of these appears to be about equally disastrous so far as stiff clay land is concerned.

From a careful analysis of figures within my reach I find the loss in yield in heavy years such as these last five have been, is as nearly as possible $\frac{1}{4}$ of a ton of sugar per acre. This is over the whole year's crop, and includes the yield from good fields as well as poor ones; of course individually some of the fields did very much worse, one ton per acre not being uncommon, and in some very bad cases half a ton being all that was reaped, even with manure and every care and attention. This large decrease in the yield, quite 15 o/o, is by no means the only misfortune that follows such weather as we have had lately. The cost of cultivation is higher in all its items per acre, and when the poor yield is taken into account, the cost per ton made in some items is enormously increased; for instance weeding, I find has just been doubled. During average weather we can generally lay our plans for the various field operations, such as planting, supplying, weeding, forking etc., and may reasonably expect to get them executed, but of late all this has been changed, we can supply certainly, as long

as we have stumps and tops to do it with, and we must weed, but forking is out of the question, and we all know what it means to weed and not be able to fork within a couple of weeks afterwards, the fields get dirty again in no time, and now that the pinch for labourers is felt, the resident gangs are quite unable to keep estates clear and Managers have to offer high rates in order to try and induce outside people or task gangs to weed their fields. All this continual trampling of workers on the sodden land has the effect of entirely closing up the drainage pores, and the fields soon have practically no drainage except on the surface. In this state they remain until dry weather comes again and the sun causes the land to crack and open. When we have eight months of continual wet weather, it is not easy to decide on what is best to do, to help the starved-looking, chilled canes. Drilling is held by many Planters to be the correct thing, but some have long been of opinion it is not the infallible remedy it is said to be, and indeed the results of this work during two late crops on the estate I have charge of point to its not being helpful at all; these two years shew respectively 5 o/o and 16 o/o increased yield in favour of undrilled fields—of course plants were excluded. I may say the soils in both cases were very similar, and the drills were from 1 to 3 years old. It seems to me drilling has the following objections:—1st, It is expensive work; 2nd, it does not help drainage materially; 3rd, it is heavy work, and as it is generally done in wet weather a great deal of puddling of the soil by the shovelmen is inevitable, and so probably does a deal more harm than good; and 4th, it materially diminishes the land available for food to the cane-roots

when the weather modifies and the roots spread. The best way is to let the fields alone as far as shovel or fork work is concerned, simply supply lightly, weed and wait until weather moderates. If it is felt to be imperative to try and help the drainage, then shovel moulding may be found of great use, it assists surface drainage greatly and enables us to give a good moulding to the canes at times when hoe-moulding is impracticable. Burying trash is also a splendid help to drainage and may be performed by the shovel when it is too wet to fork, it is also of some value as a manure and this brings me to a very important subject—manuring. I fear much that in such times as are under discussion, even manure, which in average seasons is one of the Planter's best friends, is often of little good; nay more, if you think of soil in such a state as I have endeavoured to describe, with no drainage to support a cane crop, though the fields are quite clean when the manure is applied, if you cannot get people to keep them clean and forking may not be done, then it stands to reason, and is a fact, that the cane-roots being unhealthy are unable to utilise all the manure, the weed roots in the soil being in a more natural condition will unfortunately greedily absorb the plant-food and the result is an increased growth of grass to add greatly to our troubles.

There are other changes that may be seen, and perhaps not the least strange is the alteration that takes place in the grasses on heavy soil land. Fields that you knew grew nut grass *(Cyperus rotundus)* or para grass *(Panicum molle)* so luxuriantly in former times, are now found instead to be infected by sour grass *(Paspalum conjugatum)*, a sort of wire grass *(Scirpus capillaris)* that

at other times grew at the bottom of the drains, and a grass called locally busy-busy *(Cyperus laxus)*. The reason for these substitutions must be that the land is now so sodden and altered that it can no longer support the former weeds, and so the latter, which are more hardy and require less depth of soil have taken their place.

When you now abandon fields to rest them or change their crops, you will not find them covered by black sage in say 6 months as formerly, but if let alone there will shortly be a heavy growth of sour grass.

Provision growing is an entirely separate industry from cane-cultivation, it is under a quite different set of people, and it too has suffered quite as much if not more than the latter. The following facts I am enabled to lay before you. At *Houston,* which is conveniently situated to the Georgetown Markets, there has always been a considerable acreage so cultivated; in 1889 there were 305½ acres being worked; 1890, 152 acres; 1891, 69½ acres; 1892, 67 acres and last year only 47½ acres. This falling off is entirely due to unfavourable seasons and it is within my personal knowledge that many of these Farmers, principally Portuguese, lost very large sums of money. I saw them persevering in weeding and supplying, but the rains kept on and they threw up the sponge and left, leaving in many cases fields on which $50 per acre had been expended, with absolutely no return, rather than continue against what they considered such fearful odds.

There are many more ill-effects I might mention, such as the wretched spring we get from fields cut in heavy weather, entailing a highly increased expenditure in sup-

plying; and also the great damage done lately by borers and caterpillars, a natural sequence to weakly, unhealthy, young canes; as well as the presence of late years of a regular plague of red stinging ants in the cane-pieces, adding much to our difficulties in getting people to work the fields, and so on, but I have already said enough to show how very adverse the effects of late rain-falls have been and I shall now conclude by saying that a further reference to the B. G. Directory will show that to the end of last year, the names of some 9 sugar estates, other than those amalgamated, have disappeared since 1889, and though it would perhaps be too much to say that adverse seasons were entirely responsible for this, still there is no doubt they materially helped in their downfall.

A high if not the highest authority in the colony on climatic changes says these generally occur in cycles of 5 or 7 years. We have had 5 years already, appearances this year point to a very favourable change in the weather, so let us hope we are done with bad seasons and that we shall have a return of our former good times, to put those of us who have come through so many disappointments lately, into good heart, to renew with energy the all important factor in the colony's welfare—the careful cultivation of the soil.

Steam Husbandry with Open Drainage in Demerara.

*By the Hon. E. C. Luard.**

AGREEABLY with a promise which a short time back I gave our President Mr. R. G. DUNCAN, I will now, with your permission, read a short paper on Open Drainage and Steam Husbandry in Demerara.

It is with great diffidence that I approach the subject, and it is only because I could not hit upon any other agricultural subject of interest, to which I could do justice, that I chose this one.

I must premise that there is nothing original in what follows, which in the main will prove simply a plain statement of an experiment, the account of which in its initial stage may possibly interest fellow-planters and others.

You are all aware that horse husbandry was introduced into the colony a great many years ago—as far as I can gather, immediately after Emancipation.

On the 12th July 1875, the following resolution was passed by the Court of Policy:—

"That the resolution of the Combined Court, authorising the Governor to offer premiums, not exceeding in the whole $100,000, to any person or persons who shall introduce into the colony machinery capable of tilling the soil, and performing other work connected with the manufacture of sugar at a moderate expense, be communicated to the Planter's Committee; and that the Committee be invited to draw up for publication a statement of the agricultural operations in the

* Read before the April Meeting of the Society.

field, which, in their opinion, can be effected by machinery specially designed for the purpose, and of the difficulties which the face of the country presents by reason of the open drains and canals which intersect the canefields; aad also a statement of any other operations, such as the carriage of canes from the field to the punts, in which machinery might supersede manual labour. And that the Planter's Committee be further requested to express their opinion as to the amount of premium which should be offered for each description of machinery."

The resolution of the Combined Court referred to in the foregoing resolution of the Court of Policy is as follows:—

"That looking at the fact that almost the whole of the Agricultural work in this colony is done by manual labour, and at a very great cost, this Court is of opinion that encouragement ought to be given with a view to the introduction of labour saving machinery for the cultivation of the soil and other purposes connected with the manufacture of our staple—resolved therefore that His Excellency the Governor be authorised, and he is hereby authorised, to offer premiums not exceeding $100,000, to any person or persons who shall introduce into the colony, machinery capable of tilling the soil and other purposes connected with the manufacture of our staple of this colony, which can be worked at a moderate expense compared with the expense at present attending the cultivation of the soil, and that such premiums be offered on terms and conditions to be fixed by His Excellency the Governor and the Court of Policy."

From this it will be seen what great interest was taken in the matter, and in connection with the above resolution, the late Mr. WM. RUSSELL, the "Sugar King," as he was justly called, wrote a very valuable pamphlet entitled "Report on the Agricultural Wants of British Guiana," (printed by WATERLOW & SONS) and presented it to the Court of Policy through the Planter's Committee of British Guiana.

In this pamphlet Mr. RUSSELL gave a most interesting account of the attempts—(and failures)—to make horse husbandry a success on our sugar estates, and according

to Mr. RUSSELL the first attempt was made at Pln. *Canefield*, Berbice, followed by another at Pln. *Friends*, and by yet another (coupled this time with tile drainage,) at Pln. *La Penitence*.

While these trials of horse husbandry were going on in the colony, considerable attention was being directed at home to steam ploughing, and the legislature of this colony voted $5,000, to be offered as a prize to any person who introduced steam tillage into the colony.

The late Mr. RUSSELL states that the first trial of *steam* tillage was made on Pln. *Houston*, and subsequently further trials were made at Leonora, for which Mr. RUSSELL claimed "partial success." and which, the "Sugar King" in his pamphlet already referred to, remarks, attracted the attention of Mr. CRUM EWING, with the result that this gentleman decided to send out to Demerara a practical agriculturist to report upon the feasibility of carrying out on his estates, a system of modern tillage, with tile drainage, &c.

In a letter which Mr. ALEXANDER CRUM EWING wrote to me last year, and which was subsequently published in *The Louisiana Planter*, the opening paragraph ran as follows:—

"There is probably no part of the world except the Straits Settlements where so thorough a cultivation is given to the land by hand labour alone as in Demerara; or where so many people are required to the acre. And, it is a question which must strike everyone interested in cultivation there, what would be the effect if anything were to happen to curtail imported labour, or, if there were an exodus of the coolies, either returning home or emigrating elsewhere?

"At the time it was decided to introduce implemental cultivation on our estates, there had been some cause for apprehension. We had 605 indentured coolies and a good many (240) Chinese. The whole cost of introducing the latter was undertaken by a few proprietors of

that day. The outlay of establishing a resident population had been very great. These were the principal but not the only reasons which determined us to think of implemental cultivation. Steam tillage is the most perfect cultivation that can be applied to clay lands. It is under control in such a way as no labour gangs can ever be, and will stir the land effectually 12 inches deep without the fear of scamping."

A preliminary report seems to have been furnished to Mr. EWING by Mr. WM. GRAY (late of *Goedverwagting*) and this report was sufficient to induce Mr. EWING to go on, "and Mr. MCGIBBON," to use Mr. EWING'S own words "was engaged to carry out the operations on a more extended scale," and the letter further states that "No new undertaking in a colony could have been better carried out." The full account, well worthy of perusal, will be found as said before in the *Louisiana Planter*, No. 1 of Vol. xii, January 6th, 1894; for present purposes it will be sufficient to say that tiles, after considerable trouble and great perseverance, were successfully laid at Plns. *Better Hope* and *Montrose*, and at first "except where there were was caddy, worked even better than was expected." Later on, the ploughs were got to work, first balance ploughs, and then balance cultivators, and Mr. CRUM EWING stated in his letter "No men at home could work the engines and implements, better than the estate's people."

The letter closes as follows (and as what I am about to read has been but recently published in the *Louisiana Planter*, I am at liberty to repeat it):—

"At this distance I cannot form a decided opinion as to the causes that have led to the rapid deterioration of the cultivation of our estates within the last few years, but from what I saw I consider that sufficient attention was not always paid to the main drainage of the estate. I am also satisfied from what I saw, and from comparing in the journals

the work done with the weather, that much field work was gone through at unsuitable times. It got behind and *had* to be done, with a result that has produced disastrous consequences."

This brings me to the chief part of my paper. The meaning of the above quoted paragraph may be briefly stated to be this. The tile drained and steam tilled fields of the Messrs. EWING, which for a considerable time had given satisfactory results, and profits commensurate with the magnitude of the undertaking, namely the introduction of steam tillage and tile drainage, no longer continued to do so, and at last, after two abnormally heavy seasons, I was asked in a friendly way by Mr. CRUM EWING to take a ride round his East Coast property and say what I thought of the cultivation. This I did—and found that existing conditions were capable of improvement. I subsequently took charge of this East Coast property, and I propose now very briefly to tell you in what manner it is proposed gradually to try and combine steam husbandry with open drains, tiles not having come up to expectations, or rather not continued to do so in all the fields of the estate. For the enlightenment of those who are unacquainted with the appearance of a tile drained field on Messrs. EWING'S estates, I may say that they are perfectly flat or nearly so, with, as far as the eye can see no drainage at all, at least no *open* drainage. The tiles were laid originally in the old drains, and then covered in with earth from the surface of the half of the bed on each side of the drain.

Last year, in fields where it was quite evident the tiles were either choked, or the earth over them too close to admit percolation, open drains 1 to 2 feet deep were dug

over the old tile drains, and in some fields in *between* them, and in certain cases a centre tracker was opened from middle-walk to side-line and then surface water was drained into this by shallow drills leading into, and dug at right angles to this tracker. Temporary relief was thus obtained but the grave question had then to be considered, whether by degrees to open the drains *altogether* and by so doing practically condemn not only the tiles which had been laid with so much care, and at such an outlay, but also steam tillage, or, whether this should only be done here and there in individual fields. No hard and fast rules could be laid down, and the advantages of steam tillage being so enormous, other expedients had to be carefully thought over, and if decided on, put into execution with great caution, guided by weather conditions and other circumstances as they existed.

It will be understood that the temporary "deterioration of the cultivation" referred to by Mr. CRUM EWING, a deterioration which I am happy to say no longer exists, was partly due to insufficient drainage caused by the tiles silting up, and in some fields to surface water in very heavy weather, being unable to drain through the land quickly enough, and deep enough to reach the tiles. This lack of drainage was worse in some fields than in others, and the conclusions arrived at, were, that in a heavy season and in stiff soil, the tiles would never prove as efficient as open drains, and it therefore became necessary to set about considering how a system of open drainage could be established, without at the same time abandoning the use of the plough, which carefully superintended does such excellent work and at such a low cost. The only course I could think of, and in this I was greatly

helped by others, was to turn all new fields, that is all fields in grass, when these were about to be planted, into Dutch fields as far as drainage went, but English in respect to the position of the cane rows. Now at Plns. *Better Hope* and *Montrose* there is abundance of splendid land, tile-drained and in grass, and it was decided to make a commencement with three fields on *Montrose* and one on *Better Hope*. The latter has not yet been actually planted, but the three former were planted last December, and have now a healthy vigorous stand of canes and look very handsome. Recently four more fields have been added. The method pursued in these will be easily followed by reference to the plan on the table. First we turned over the whole surface with the balance plough, then we lined out the drains, a tracker down the centre from middle-walk to side-line, and the usual drains at right angles to it, and then the cane holes were lined (as will be seen in the diagram) *parallel with the drains*. Four new fields have just been laid out somewhat differently. Instead of one centre 4 feet tracker two 2 feet trackers have been dug, dividing each field into three equal portions. Since this was originally written over 100 more acres have been similarly treated.

The plough as you are aware is worked across a field from punt-trench to punt-trench. Supposing two cuts are desired the plough travels up one side of the opening and then back down the other, and at each end it is lifted by a crane in the punt and swung round and dropped on to the next opening. Now the difficulty we had to contend with was getting the plough over the tracker in the middle of the field. Three methods were at first suggested, as follows:

1. To run the plough on to a skeleton platform (to allow room for the tines) on 4 broad wheels, which could be moved up and down the tracker.

2. To run the plough across the tracker, cleaning it out afterwards.

3. To turn the plough by manual labour when it reached the tracker.

The last plan has been temporarily adopted in four fields. This turning requires about 6 to 8 hands. In the event of the platform on wheels being subsequently tried, which however is not likely, it is proposed to parapet the tracker on each side, so that the tines of the plough will work free of the soil, before the plough mounts the platform. In the case of the fields prepared with two trackers instead of one, it is proposed to run the plough right across them, cleaning them out afterwards at a cost of 72 cents each per fifty roods. The latter plan at present is considered the best. The above expedients may seem somewhat troublesome, but when it is remembered what labour and expense the plough saves, it will be readily understood that we are prepared to go to any trouble, to make one of these systems, or any better one, a complete success.

Now there is a rather important matter which has not yet been touched upon, and which I am sure has not escaped the attention of Planter friends present.

The following paragraph, which I quote from Mr. RUSSELL'S report, will give an idea of what this matter is. That gentleman writing of Pln. *Enmore*, said, "Mr. STOKES has now laid out several fields on the Louisiana system of planting, that is with the cane rows running parallel to the small drains, so as to overcome the difficulty

of crossing these when cultivating between the cane rows. This system may answer on porous soil, but on stiff clay lands it fails signally, each cane row holding water like a basin."

Such a possibility was not overlooked at *Vryheid's Lust.* As a matter of fact however no inconvenience on this score has been experienced so far in the three fields at *Montrose,* which are situated near the front in stiff soil, and it is believed that no trouble from cane rows holding water in the manner described by Mr. RUSSELL, will be experienced if only because of the existing tile drains running at right angles to the open drains and into them. It will be understood that the new open drains, running at right angles to the tiles, render access to the latter very easy, and the tiles being open at every three rods, cleaning them out is a very simple matter. These anticipations have since so far been fully justified.

This is practically the length to which we have at present gone.

In conclusion I may say that I shall be very happy to show any Planters present, round the cultivation of *Vryheid's Lust* and *Montrose,* and let them see what has been done, and I cannot conclude this reading, (your very kind attention to which I beg leave gratefully to acknowledge), without referring to the great interest which the Manager of *Vryheid's Lust,* Mr. JUNOR, has taken, and the great assistance he has rendered, in the work referred to in this paper.

"Some Enemies of our Cane-fields."*

By S. R. Cochran, Manager, Plan. Versailles.

WHEN asked early in the year, by our esteemed President, to prepare a paper on an Agricultural Subject, to be read before the Society. I accepted with some diffidence, thinking that anything I could put before you, would be wanting in interest. If however, the few notes I have put together, mostly from personal observation, are of any interest, I shall be amply rewarded.

The subject I have chosen, "Some enemies of our Cane-fields," is a somewhat wide one and for convenience may be divided into several heads, viz.: beasts, insects, weeds, grasses and sedges, unfavourable seasons, and scarcity of labour. Of the animal plagues of the cane the rat *(Mus decumanus)* may well take the first place, as it gnaws through the young shoots close to the ground and totally destroys them. Ripe canes are also attacked and eaten almost through, causing them either to rot and die, or by allowing the air to get into the juice, spoil it for manufacture. I have seen considerable damage done in this way in Berbice, where in the dry seasons the rats left the savannahs for the fields and did serious injury, entailing great expense to keep them in check.

Of other wild animals the water-haas *(Hydrochœrus Capybara)* is perhaps the most destructive, though luckily not so plentiful; these go in small herds and will do a great deal of damage in even one night.

* Read before the May Meeting of the Society.

The grey fox *(Canis rudis)*, and I think also the crab dog, *(Procyon Cancrivorus)*, chew the joints for their sweet juice, and kill the individual cane. I have known the fox to pull up freshly planted tops and destroy them, either for the juice, or the grub of the large grugru worm. How far foxes, ocelots, hawks, yellow-tail and other snakes, and salempentas, contribute towards keeping down rats by destroying them for food is not easily determined. That the last named is an excellent ratter, I know from actual observation.

The ordinary means of destroying rats, is by men with dogs, but I fear these so-called ratcatchers often kill other animals, which are really rat-destroyers. Some proprietors have introduced the mongoose, *(Herpestes griseus)* in some numbers to kill the rats, but I fear these will not increase in a country with so little cover to protect them from natural enemies. In Jamaica, where the mongoose was introduced years ago by I believe the late Mr. BANCROFT ESPEUT, the cane-piece rat has been almost exterminated, and the few that are left have taken to the tree-tops, where some years ago they were doing considerable damage to the young nuts.

The rats being no longer available in sufficient quantities to supply the mongoose, which increases rapidly, where as in Jamaica it has perfect cover in the crevices of the rocks, heaps of stones, &c., they have taken to killing poultry; and five years ago it was impossible to rear feathered stock of any kind, except in well fenced yards. The insectivorous birds of the island have been destroyed by them to such an extent, that the ticks, *(Ixodes, sp.)* which the birds used to keep in check, have increased enormously and are now a serious incon-

venience in some districts both to stock and human beings.

Of domestic animals, cattle of all kinds eat the tops and leaves of the cane readily. In the islands and other sugar growing countries where oxen are used on the estates for draught purposes, they are largely fed on the tops and leaves, and the ruin created by a herd of a few hundred breaking out of their pen at night and taking a walk in the canepiece, is never forgotten, if once seen.

Goats are very destructive on an estate, but sheep as a rule ignore canes when they get into a field and confine their attentions to the weeds and grasses on the banks.

Of the insect pests peculiar to the cane in this and other countries, borers, a term generally applied to the caterpillars or grubs of a group of moths, beetles and other insects, are most destructive. Two of the commonest of these are *Sphenaphorus Sacchari* and the gru-gru or tacuma, a large species of which *(Rhyncophorus palmarum)*, also attacks cabbage trees. Others are *Strategus atœus*, a very large grub which produces an enormous beetle, these I am told did considerable damage to the cane stools at *Port Morant* lately.

A small variety resembling a hardback in shape but of a bright brown colour and not quite $\frac{1}{8}$ of an inch in length has been plentiful in Barbados of late years. This has been called the shot-borer *(Xyleborus perforans)* and was occupying the attention of the authorities in Barbados some three years ago. I am told they have been found in the seedling canes at the Botanical Gardens. The damage is done by the grub, which, lodging in the stool of the newly cut and springing cane, eats

into the heart of the young shoots and quickly kills them. They also attack canes of mature age, easily piercing the silicious outer rind of the cane with their powerful mandiblcs and the sharp lance-like cutting instruments with which their mouths are armed. The soft pulpy mass of the inside is pierced and eaten in all directions, the cane gets red in the heart and the juice becomes exposed to the air, ferments, and is rendered useless for sugar making. A great deal of damage has been done on the West Bank and the West Coast this Spring; borers occupying the young stools and killing the shoots almost as they appear. When the work of the grub is over and before the formation of the chrysalis, they spin themselves into a cocoon made of the fibres of the cane, and these may easily be found when borers have been prevalent in a rotten cane, or top, or heap of trash on the banks. The larger beetles of the *Rhyncophorus* species very often make their presence unpleasantly known bv flying against one's face, which they strike with no small force.

Of rust, fungus and other diseases all more or less produced by insect life, and of which complaints come from time to time from different countries, we are happily free.

The means advocated for checking the ravages of these insect pests have been many and varied. When they have been plentiful on an estate, the trash is generally burnt off as soon as canes are removed. If the tops are required for planting they may be first soaked in lime water or some antiseptic. I have seen the teaches used for this in Barbados. Other means are the encouragement and cultivation of their enemies, such as

ants, the Ichneumon fly, insect-eating birds, &c., &c. As however disaster has so often followed man's attempts to interfere with the distribution of nature, such means have to be advocated with caution. Caterpillars of two or three varieties I have known to appear annually about May for the last 15 years. These are the larvæ of *Diatræa saccharalis*, which feeds when possible on the young cane leaves, *Duphax sacchari*, common on saman and clammy cherry trees, and no doubt some others. These almost invariably deposit their eggs first on the grasses of the dams, or on grassy dam-beds, or drains in the fields. When the caterpillars appear the grass is soon eaten off, and they attack the canes, (young ones by preference). In Berbice however I remember several acres of canes quite nine months old being entirely denuded of leaves.

Up to last May I had never seen any considerable damage done by caterpillars, but then they appeared in thousands, first on the dams, and later in the fields. They began operations in some six or eight fields in the centre of the estate and rapidly spread north and south, crossing the sidelines on any grass there was or on the bodies of those who attempted the crossing first. Everything possible was done to confine them to the fields they started in, but in spite of all efforts some 90 acres of canes were completely eaten off. Many of the young centre shoots were eaten so close off, that they withered and died either from that cause or on account of the roots alone not being able to sustain life in the plant, through the heavy weather which followed. In no case was the yield from the fields over half a ton per acre, and in many much less.

Up to January we expected these fields to spring, and some looked fairly well, but the stools seemed too weak to exist and the few fields which did not abandon themselves, had to be heavily stumped, and even now, show the spots; the land looking stiff and barren, as if actually poisoned by the caterpillars. So thick were the resulting moths in the grass of the dams, that any quantity of specimens could be secured by hand. The only remedy seems to be picking them off at their first appearance; or beating them down and trampling them into the ground. Quick-lime might keep them from crossing if no rain fell. Burning off trash, and applying lime is advocated, but that can only of course be done to destroy eggs after canes are cut.

Ants of different kinds pay attention at times to the cane. In heavy seasons, the common red ant is driven above ground by wet and often forms its nest round a cane-stool to the discomfiture of the labourer, who is afraid to disturb them with his hoe, or clean out the cane-roots.

Wood-ants too are sometimes troublesome in light soils where they build their nests on the canes, using no doubt part of the cane for food as well as the fibres for their nest. In Berbice years ago, I have seen them carried out of the fields and burnt in large heaps on the dams.

The nests make wonderfully good fuel for workers cooking aback. On the West Bank except on our light back soils they are comparatively scarce.

Weeds, grasses and sedges, are in heavy seasons such as we have had of late years most formidable enemies of the sugar cane.

The cane cultivated here, itself a grass, (*Saccharum officinarum)*, is of the variety Bourbon, so called from the place from whence it was introduced. It is said to have improved in size and richness of juice in the West Indies. Hitherto this cane has held its own in this country, and has seemed in every way the most suitable.

Experiments in planting canes from seeds, show however that not only heavier weights of cane but correspondingly richer juice, can be got from other varieties obtained in this way. At the Botanical Gardens, very interesting and valuable experiments are being conducted by Mr. JENMAN and Prof. HARRISON, and it is only a matter of time to ascertain whether these new canes will retain their character when propagated from the tops of the parent plant.

When the canes are reaped from the land, weeds and grasses quickly appear, and unless chopped out before they get a good hold, they bear seed and spread rapidly, their growth covering the ground, their roots binding the soil, and absorbing a large portion of the manure intended for the canes.

This entails frequent weedings at a time when labour is scarce from competition. In light soils aback in normal seasons the principal weeds and grasses to be met with are a milky thistle *(Emilia sonchifolia)* the silver fern *(Gymnogramma Calomelanos)*, another common fern which is always found in light soils, *Blechnum serrulatum*, several light grasses such as *Panicum laxum*, *Leptochloa virgata*, *Digitaria setigera*, *Leersia hexandra* and sometimes on sand reefs, *Anatherium bicorne*. Bitter tally, *(Mikania Amara)*, from which the creoles concoct a remedy for pains, runs over the canes and can

only be killed by pulling it up. Cana grass (*Commelyna Cayennensis)* one or more Convolvulaceæ *(Ipomæa fastigiata*), &c.), and weeds such as *Erigeron* and other Compositæ, help to swell the list. Mucca-Mucca *(Montrichardia arborescens*) and several caladiums also occur. The grasses to be found, usually, on front stiff clay lands, would principally consist of Bahama grass, (*Cynodon dactylon*), Nut grass, *(Cyperus rotundus)*, Sour grass, *(Paspalum conjugatum)*, Para grass, *(Panicum molle)*, and Cana grass and Silver fern in drills and drains. Mucca-mucca, several caladiums, including a bronze one, and in some cases, a pretty grass called *Pennisetum setosum*, besides *Eleusine Indica* and other weeds.

In the late heavy seasons there was a great change in the vegetation of the cane piece. In front lands the canes did not cover the land as they should, and many grasses that in ordinary seasons would have been killed by the absence of air and light have been found to survive throughout the year's growth of the cane. Bahama grass, which used to get spindly and thin, and even eventually disappear, at from six to eight months with a good cover, as also the Nut grass, though in this case only to re-appear with air and light as fresh as ever, has in many cases been able to exist throughout the season. Mucca Mucca and Silver fern find a home on the slopes of the drains, and though more and more spindly as the shade increases are often to be found when canes are cut. Vines run up the canes, and if not pulled off in weeding and trashing, live throughout the whole season as they grow high enough to get air, but in an ordinary season, except these, no weeds should be able to maintain the struggle against the cane, and the fields when

cut, should, except for an occasional hog plum, *Spondias lutea*, sown by some coolie carrying the fruit into the fields, or a Trumpet tree (*Cecropia*) missed in trashing, be perfectly clean. The late seasons have however presented a more marked difference. Formerly, canes covered the ground as the soil became changed in its character from incessant wet, and an entirely different class of grasses sprung up, properly sedges, of a more or less aquatic nature. These made the work of weeding much harder and more expensive, some of them growing so close, as to make a perfect sward over the ground. These the labourers called hair grass, *Scirpus capillaris;* like the other species most of which we commonly term busy-busy not grasses, but really *Cyperaceæ* or sedges. Dry weather and tillage causes an entire change in this vegetation and the last few months has been sufficient to relegate most of them to their former positions, the bottoms of the small drains. Sour grass, formerly almost unknown in the cane piece, has been largely found there of late, and fields abandoned in late months present the appearance of a ring of sour grass round the dam-beds, lighter grasses on the tops of the beds, and *Cyperaceæ* along the drills and drains. From figures before me of the 22 years' rainfall of a Berbice estate up to the year 1887, I find the average rainfall for the year was 75·65 inches or about one-half the rainfall of late years. About 75 inches of rain divided into two wet and two dry seasons would appear to give the best results, though doubtless some estates could take more with advantage. Good drainage, imperative always, is a necessity in heavy seasons, though even with good drains, trenches, and outlets, heavy clay

soils cannot be drained quickly enough to keep the canes from getting chilled, during almost incessant rains of nearly an inch a day.

Tillage of banks, drilling, &c., helps the land to dry, but neither can be well done until weather moderates. Steam cultivation is undoubtedly the best form of tillage, but although good work can be done, and by dropping the back tine, with a large shoe on it, a mole drain formed. Steam ploughing must depend on tile drainage for its success. I fear this form of cultivation can never become general here, as although much has been done to make tile-drainage a success it has never yet succeeded in Demerara in keeping the land free from water in heavy seasons. Tiles were first tried here in 1845, and though the first year gave splendid results, the second went back below the average of open drained fields.

The only other form of drainage possible, is that of open drains and surface drainage, which, though wrong in theory, is almost universally adopted here. Land is drained not only to let the water out of the soil, but to let in air, and allow the fertilizing rains to filter through and leave in it some part of the nitrogen contained in the rainfall.

When the land gets water-logged all air is excluded and the activity of the land as a plant producer ceases. Under draining deepens the soil by lowering the line of water beyond injury to the roots, and it must have struck us all in late years how the cane roots have run across the banks without going down so deep as in other seasons when the soil from better drainage was good for some distance down.

Dry weather, as well as wet, must at all times enter into the calculations of the planter, and though nothing can equal a dry season of not too long duration for preparing a soil well tilled for rapid growth of plant life, few calamities can be greater than a prolonged drought in Demerara, as even with our grand Water Services but very partial irrigation can be obtained. The effects of flooding up the drains, although no doubt beneficial to the canes, has a bad effect on the land. Irrigation to be correct must be applied from the highest point and allowed to flow into the ground and thence into the drains. Jamaica has a magnificent Irrigation System by which the part of the country along the Rio Cobre is supplied with water high enough to irrigate any part of the fields.

Of late seasons the scarcity of reliable labour for field work has been general throughout the Colony, and field operations have been delayed, in consequence, until almost too late to promote growth. This scarcity is mainly due to operations in the interior of the Colony, where the search for gold employs thousands of labourers at high rates of wages besides rations.

The only possible remedy is increased immigration from India and elsewhere, and it must be the sincere wish and hope of everyone who has the interest of the Colony at heart, that, in the near future, good seasons and prices may reward the perseverance of the Estates' proprietors, who have had for many years past an uphill fight against heavy odds.

*Cost of Sugar Production in British Guiana.**

By. R. G. Duncan, F.R.

THE cost of producing sugar is naturally a question of vital importance to those concerned in the welfare of this colony, and more especially to every one connected with the sugar industry. It is desirable for me to state at the outset, that in the following paper a ton of sugar, when not otherwise specified, means a ton of 1st grey crystals polarising 96 deg. This explanation is necessary, as on some estates only one quality of sugar is made, whilst on others two and even three qualities are manufactured. It must also be understood that the figures hereinafter given, as to cost of growing and manufacturing a ton of sugar, are not supposed to be applicable to all estates, on account of the varying conditions that exist, such as difference in quality of soils, supply of labour, methods of drainage, distance from shipping port, &c. The figures stated are intended to represent a fair *average* cost, and to meet individual cases, various additions would have to be made to, or deductions made from the special items of expenditure which local and other conditions render either below or above the average. In estimating the cost of manufacture, I have based my calculations on the assumption that a first grade of sugar polarising 96 deg. is made, 1st molasses re-boiled to give a 2nd grade of sugar, and 2nd molasses used for making rum, as this is the system of manufacture in

* Read before the June Meeting of the Society.

vogue on most estates in this colony. Where 1st sugar only is made and 1st molasses are sold, or where 1st and 2nd sugars are made, and 2nd molasses are sold, some difference would necessarily exist in the cost of such items as fuel, packages, labour, &c., but any variation in expenditure arising in this way can easily be calculated for the purpose of comparison if desired. Before entering into details as to cost of growing and manufacturing sugar, it is desirable that reference should be made to some points that are of importance in considering the subject. During the past 20 years the average value of our staple product has varied from $140 to $60 per ton. Although the fluctuations have been considerable the tendency for many years has always been eventually towards a lower range of prices, and planters have had to make never ceasing efforts to meet an ever falling sugar market. During recent years, after periods when unduly high or low prices have ruled, the market has usually settled with sugar polarising 96 deg. quoted at 3c. per lb. in Georgetown. A ton of sugar at this price would realise $67 20, and if to this is added the value of the 2nd sugar and rum pertaining to a ton of 1st sugar, viz., 330 lbs. 2nd sugar at 2¼c. per lb. = $7 42, and 30 gallons 40 o.p. coloured rum at 25c. per gallon = $7 50, the total value of a ton of 1st sugar would be $82 12. For some time past the price in Georgetown of crystals polarising 96 deg. has been from 2½ to 2¾c. per lb., a figure at which not many estates in the colony, except during favourable seasons, can make both ends meet.

In connection with some of the figures given in this paper it is important that the average yield of sugar per

acre should be referred to. With ordinary seasons and land carefully tilled and manured, the average yield of 1st sugar per acre may be safely stated at 1·65 tons. This yield is often considerably exceeded, and on estates with fertile soil an average yield of over 2 tons sugar per acre is got, but on the other hand, during unfavourable seasons, the average yield on many estates falls below 1¼ tons sugar per acre. I assume that during ordinary seasons, and in view of the provisions made for tillage, manure, &c., in the estimate I am about to submit, the average yield of sugar that might reasonably be expected would be 1·65 tons per acre. If the average yield obtained is below 1·65 tons sugar per acre, the cost of production will be higher than that estimated, but on the other hand if the yield is in excess of 1·65 tons per acre the cost of production should be less.

In view of a probable lower average range of values for sugar in the future than 3 cents per lb., it becomes a serious question to consider how the cost of production can be further reduced. The production of sugar in the whole world is increasing more rapidly than the consumption, and aided by bounties and protective duties the sugar growers in various countries can produce sugar at 2½ cents per lb. with a fair margin of profit. I do not wish to be accused of taking a pessimistic view of this subject, but it is well that everyone should realise exactly how our staple industry stands. It is evident that the Planter who cannot make sugar for 3 cents per lb. or less will not be able to carry on a sugar estate and make it a paying concern. The following are suggested as some of the means which might be adopted to attain further reduction in the cost of production:—

1. The selection of a more productive cane than the "Bourbon." Messrs. HARRISON and JENMAN are studying this question, and may soon be able to recommend one of the promising seedling canes growing at the Botanic Gardens, as superior to the cane now generally cultivated in the Colony. So far the Bourbon has proved superior to the older varieties of canes experimented with, but a few of the seedling canes give indications of being better than the Bourbon.

2. The adoption of methods to further increase the extraction of juice from the canes and of sugar from the juice. Double crushing is now extensively in use, the average result obtained being an extraction of juice representing 72 o/o of the weight of canes without maceration. It is quite possible, considering results already obtained by means of diffusion, that this method of extraction will eventually prove the best.

3. The further reduction of fuel used in factories. A great deal has been done in this direction during recent years, but there is no reason why the megass alone should not represent all the fuel required, and this would mean a saving of about $2 per ton sugar on most triple effet estates.

4. The reduction of expenditure on labour by the adoption of labour saving appliances in field and factory.

5. Increased immigration, by means of which the employer will be able to get work done at reasonable rates of wages, and have tillage attended to at the proper time; a most important matter. As a measure of relief to the sugar industry, and to promote the general welfare and prosperity of the Colony, the time has arrived when the general revenues should bear the whole burden of immigration.

6. The improved and more scientific treatment of the soil as regards drainage, tillage and manure.

There are other ways in which the cost of sugar production may be cheapened, but the foregoing appear to me some of the most important, demanding immediate consideration.

Having thus far referred to some necessary preliminary matters, I will now proceed to deal with figures bearing on the cost of growing and manufacturing a ton of sugar in this Colony. I have divided the cost of production into two main heads, viz :—First, Labour expenditure, sub divided into labour under cultivation and labour under manufacture, and Second, Expenditure other than labour.

Labour Expenditure. The first and most important item for consideration under this head is that of *Tillage.* A sum of $26 per acre per annum should cover the cost of tillage proper, and this would represent $18 per ton sugar, on the assumption that the yield is 1.65 tons and that 12 o/o of area under cultivation is not reaped each year but turned over. During the past few years, on account of the unfavourable nature of the seasons and the great demand that has existed for labour, the average cost of tillage has been considerably more than $26 per acre, in some cases the cost has been as high as $35 per acre, but with moderate seasons and a fair supply of labour $26 should be sufficient. Tillage proper includes the following heads, under which expenditure is incurred, viz., relieving, weeding and moulding and trashing, mixing and applying manure, lime, &c., supplying, forking banks, burying trash, cleaning and digging drains, drilling, half-banking and re-planting, grass banking, lining, superintendence and various sundries. The cost

of tillage in Berbice is rather less than in Demerara, and this is mainly owing to the fact that canes are burned before cutting, thus getting rid of most of the trash, saving relieving and burying of trash later on. If trash can be buried in dry weather, immediately after the canes are cut, it is of great benefit to the soil, but it cannot be of much value if buried after lying exposed for months. No ill effects appear to result from the system of burning adopted in Berbice, and at times it must do good by destroying insects, &c. This year I have seen extensive damage done to young canes by the borer in Demerara, but little if any has been noticed in Berbice. Canes in fields liable to be over-run with Bahama grass should not be burned, as this grass grows very rapidly where the ground is clear. Sufficient advantage is not generally taken on most estates of the opportunity that exists for resting land. On nearly every estate there is enough land lying fallow to allow of the whole of the older cultivated land being rested in rotation, and May and June plants should be established whenever possible on new or rested land. If this were done a better average yield of sugar would be obtained and the cost of weeding would probably be less. On many estates land that is known to be rarely remunerative is kept in cultivation. It requires a heavy outlay on tillage and gives generally a poor yield. In such cases if other and better land is not available, it is well to reduce the area under cultivation by abandoning poor land. A small highly cultivated acreage, within certain limits, will always give better paying crops than a large acreage not thoroughly tilled or attended to. If steam husbandry could be adopted in connection with our system of open drainage it would

be an enormous boon to the colony. It would reduce to a great extent the number of labourers required on each estate, and the tillage of fields could be attended to immediately after cutting. At present fields are often left for months after canes are reaped before labour is available to till and open up the soil. There should be no insuperable difficulty in tilling the land by means of steam ploughs and cultivators, even if it meant the partial filling up of open drains, and expense of clearing them out again. The next item of labour expenditure to be considered is that of *sundries* belonging to but outside of tillage proper, and under this head is included the cost of digging and cleaning drainage trenches, parapetting, weeding and repairing dams, attending and repairing kokers and locks, burning earth and repairing roads and bridges, watchmen and rangers, forcing drainage channel and working draining engine, sea defences, sundries, and two-thirds cost of messengers, staff attendants, weeding and cleaning yards, hospital staff, repairing dwellings, etc. A sum of $3 50 per ton sugar is sufficient to cover the average outlay under this head, but where sea defences are troublesome a very much larger sum may at times be found necessary. The Government have arranged to pay $1 per rood per annum for the upkeep of public roads passing through sugar estates, and this will mean a slight saving under the above head. The arrangement made is in every way a satisfactory one, as the Government could not possibly have maintained the roads and bridges at this figure, and it was fortunate that the proprietors of sugar estates were willing to relieve them of the responsibility. The next item I have to deal with is the cost of *cutting, loading and transporting canes*, in-

cluding superintendence, picking water canes and baling punts. During the past few years the cost of cane-cutting has been high; many of the best cane-cutters were absent in the gold bush during crop time, and labour generally was in great demand. The average expenditure, if fair rates of wages are paid, should not exceed $4 50 per ton sugar.

Labour expenditure for manufacture has now to be considered, and the first item is that of labour for *manufacture proper*. This includes the expenditure necessary in the factory, from the time the punts of canes are delivered in the mill dock until the produce is manufactured ready for shipment. In a well conducted factory, with modern appliances, a sum of $3 per ton sugar will cover cost of labour for manufacture proper. *Transport.*—Under this head provision has to be made for the cost of stock-keepers, grass-cutters, cartmen, &c., cleaning and digging navigation trenches and water supply trenches, repairing punts and transporting produce, coals and stores. A sum of $1 75 per ton sugar should meet average expenditure. *Maintenance.*—Expenditure necessary on the following has to be provided for under maintenance, viz., engineers and blacksmiths, masons, carpenters, painters, cleaning machinery, &c., and one-third cost of repairing dwellings. A sum of $1 50 should cover average expenditure per ton sugar. *Sundries and Hospital.*—Provision has to be made under sundries and hospital for one-third cost of watchmen, messengers, staff attendants, weeding and cleaning yards and hospital staff, &c., and 60 cents per ton sugar should meet the average outlay.

2. I have now dealt with items of labour expenditure,

and expenditure other than labour has to be considered. *Chemicals, engine supplies and lighting.*—A sum of $1 50 will cover the cost of requirements under this head in making refining sugar, and much can be done by care and attention on the part of those responsible, to prevent undue expenditure and waste on these items. *Maintenance.*—This includes the cost of materials required for repairs to cottages, buildings, cane punts, bridges; painters' and masons' materials and sundries. A sum of $1 75 per ton sugar is about the average amount necessary under this head, a lesser expenditure often indicating that the stitch in time policy is not being adopted. *Stock.*—The average expenditure on keeping up and feeding stock of mules, providing harness &c., should not exceed $1 per ton sugar. *Packages.*—Cost of packages should be about $4 per ton sugar, made up as follows: 10 bags for 1st sugar at 16c.=$1 60, 1½ bags for 2nd sugar at 16c.=24c., 30 gallons rum at $6 75 for puncheon containing 105 gallons=$1 92. Twine, hoops, sundries and damaged packages, 24c. *Fuel.*—On triple effet estates with modern appliances fuel should not exceed 4 cwt. coals per ton sugar, including rum, and the cost of this landed on estates would average $1 60. The average cost of fuel per ton sugar is not however less than $2, as on many estates the consumption is still equal to 6 cwt. coals. Steady work in the factory, well designed and well hung boilers, properly constructed megass furnaces, and care and attention on the parts of engineer and manager, will enable manufacture to be carried on with little fuel in addition to megass. Where fuel has to be provided for draining engines, the cost will be higher per ton sugar than average stated

above, but on coast estates, where drainage by machinery has to be resorted to, there is no doubt the more effectual drainage obtained, by increasing the yield of sugar, more than repays cost of fuel, wear and tear of machinery &c. *Hospital.*—The expenditure under this head varies according to the situation of estates, number of immigrants under indenture, &c., but a fair average cost may be stated at $1 75 per ton sugar. The cost of maintaining hospitals is a heavy tax on sugar estates, and the planter has to bear the whole outlay necessary to acclimatise new immigrants and make them useful colonists. *Salaries.*—The expenditure on salaries, including attorney, manager, engineer, chemist, overseers, boarding and travelling expenses and contributions to churches and schools, should average about $6 50 per ton sugar. *Manures.*—The ordinary application of manure costs $10 per acre, or say about $6 per ton sugar. It is very desirable that in purchasing manure, the planter should satisfy himself that he is getting full value for his money, as there is much deception practised in the manufacture of many manures. The very valuable manurial experiments now being carried out by Messrs. JENMAN and HARRISON at the Botanic Gardens will be of great benefit to the Colony, and these gentlemen deserve the best thanks of the planting community for the deep interest they have taken in the matter. *Immigration and Acreage Tax.*—As it is necessary to keep up large gangs of indentured immigrants, the average expenditure under this head should not be less than $4 25 per ton sugar. The estate with the largest indentured gang in proportion to the acreage in cultivation, stands the best chance of doing well, notwithstanding the larger outlay necessary

on hospital and immigration, because work can be undertaken more promptly, and done in a more efficient manner, and rates of wages can to some extent be controlled. Unfortunately, steady work cannot be relied on from most of our creole labourers, and they are fond of idling for days and even weeks, to try and force the employer to offer exorbitant rates of wages. If immigrants were introduced at the expense of the general revenue, it would help the sugar industry in this colony to hold its own in the competition which is growing keener every year. So far the labourer has not suffered from the low prices ruling in the sugar market, on the contrary rates of wages have increased; the loss arising from unfavourable seasons and low prices has fallen entirely upon the proprietors of estates, but eventually when the latter are unable to stand further loss, the labourer and every member of the community must suffer. It is therefore for the ultimate good of every individual in the colony that the sugar industry should be encouraged, so as to enable it to continue, in spite of the fact that owing chiefly to the industry being aided by bounties and protective duties in other countries, the selling price is now almost lower than the cost of production. *Drogherage.*—The distance from shipping port and means of conveying produce &c., that have to be adopted, governs the cost of this item, but a fair average would be about $2 per ton sugar. *Machinery.*—Under this head spares and parts for renewal of machinery have to be provided for, also foundry accounts and engineers' materials of all descriptions. A fair average cost would be about $3 per ton sugar. *Other Expenditure and Sundries.*—This includes various minor items of expenditure not pro-

vided for under any of the foregoing heads, and 50 cents per acre paid as a special contribution to the Government by the planters to meet part of the loss of revenue caused by the giving up of certain import duties to meet the requirements of the McKinley Tariff Act. It is probable that the McKinley Tariff Act will be abolished in a few weeks, and the tax of 50 cents per acre will, according to the understanding come to when it was imposed, no longer be levied. Other expenditure and sundries cost about $1 per ton sugar. *Insurance.*—Cost of insurance should not exceed 25 cents per ton sugar. There is now very little risk of fire in sugar factories and adjoining buildings, compared to the days when logies existed, and many modern factories are so constructed as to be practically free from any risk of fire. *Water supply and Stone &c., for Sea Defences.*—All estates have not to provide for expenditure under this head. The average cost may be stated at 50 cents per ton sugar, but in many cases the outlay will be double this sum. The re-payment with interest of money borrowed from the Government to provide a satisfactory supply of fresh water, is a very heavy tax on some estates, especially in the East Coast district.

In the foregoing statement no provision has been made for extensions and improvements that are outside the ordinary working of an estate, and interest on capital is also unprovided for.

RECAPITULATION;

Cost of Production per ton Sugar polarising 96°.

Labour Expenditure—	
Tillage	...$18 00
Sundries under Tillage	... 3 50
Cutting, loading, and transporting Canes ...	... 4 50
Manufacture	... 3 00
Transport	... 1 75
Maintenance	... 1 50
Sundries and Hospital	... 0 60
Expenditure other than Labour—	
Chemicals, Engine Supplies and Lighting ...	... 1 50
Maintenance	... 1 75
Stock	... 1 00
Packages...	... 4 00
Fuel	... 2 00
Hospital	... 1 75
Salaries	... 6 50
Manures	... 6 00
Immigration and Land Tax	... 4 25
Drogherage	... 2 00
Machinery	... 3 00
Sundries	... 1 00
Insurance	... 0 25
Water Supply, &c.	... 0 50
	$68 35

Payment by Results in British Guiana.

By Peter de Wever, Assistant Secretary, B G. Teachers' Association.

IN these days of searching enquiry and thorough investigation into everything that pertains to human happiness and comfort, it has become a recognised axiom of Political Economy and Sociology that the prevention of an evil is far to be preferred to its cure. Education as a preventative agency is generally considered the most efficacious in dealing with the innumerable social woes by which countries as well as communities are unhappily afflicted. It is therefore well and beneficial to consider our educational machinery, and see whether it is fitted to fulfil the purposes for which it was created, after we have first searched the records of the past and discovered for ourselves whether we have benefited by the experience of by-gone days.

In 1862, Governor HINCKS, on his arrival in the colony, found, as all Governors after him have subsequently found, that education in British Guiana was in a very backward condition. To rectify the evils then prevalent, as well as to provide means for the adequate instruction of the masses, the Court of Policy of his day passed an Education Ordinance. This made provision for the formation of a Board of Education, whose duty it was to frame regulations for the direction and control of elementary instruction in schools receiving aid from the colony. This was, strictly speaking, the first "Board of Education." Under the regulations which were soon

afterwards promulgated, before a school received the yearly "grant in aid of teachers' salaries," it was necessary that it should be examined in the Inspector's presence, and to his satisfaction. The grant was made according to the average attendance, based on a scale laid down in the Rules. Every teacher was expected to be certified, but a special licence was granted to any applicant who, in the opinion of the Inspector, was qualified to take charge of a school. The patron (or patrons) gave religious instruction at certain times specified on the time-table; but parents had the option of detaining their children at home during these hours. There were no provisions made against schools being surrounded by insanitary influences, and the standards of efficiency and subjects to be taught were left entirely to the patron or schoolmaster. Of course, the Board of Education became dissatisfied at the slow progress made by the scholars, and the evident rottenness of an education system which consisted merely in the elaborate preparation of a few answers for the annual show-days, answers, in the majority of cases, little understood by the scholars. Hence in the year 1869 the Court of Policy was again asked to pass a new code which had for its object the fixing of the grants to schools, not merely on a teacher's certificate qualifications and an examination conducted by himself, but on the proficiency of the children according to a progressive standard. All schools were expected to pass 60 o/o of the children in average attendance in the three R's to secure a grant, and of this 60 o/o of passes, 8 o/o in the First Class (VI Standard and upwards) placed a school in Class A, 10 o/o from the V Standard upwards in B, etc. But before the whole of

the grant was paid the patron was to certify that the fees received from scholars were equal to at least one-third of the previous year's grant. Under certain conditions, however, supplementary grants in aid of teachers' salaries, in aid of repairs, and for the supplying of stationery were made, apart from the ordinary grant. Untrained and uneducated individuals could be employed as teachers, provided they won the patronising smiles of managers. A heavy penalty was imposed on the conscientious teacher should he refuse to falsify his register to make good the school fees due by careless or dishonest parents, whilst the unscrupulous schoolmaster who flagrantly "cooked" his returns to bring them into conformity with an unjust and unrighteous regulation, was lauded and praised, held up as an example worthy to be imitated, and received at the hand of a judicious and conscientious Government a considerable augmentation of pay! This system was introduced in January 1870, to continue until the year 1876, when amid the hearty rejoicings of teachers, and to the satisfaction of managers, its death knell was sounded by the Commission on Education appointed by Governor LONGDEN, and, after lingering a few months, it was at last consigned to the grave of well-merited forgetfulness.

To rectify the evils laid bare by the witnesses examined before the Commission of Enquiry, among other things it was recommended that Education should be compulsory; that the whole salary of teachers should not depend on the results of examination nor fluctuate with average attendance, but have a solid basis in the shape of a portion of the salary remaining stationary; that teachers should not be entirely dependant on the

caprice of managers; and that it was desirable to secure a superannuation allowance and hold out the hope of promotion to the energetic and faithful who displayed ability in the discharge of their duties. In conformity with these recommendations, the Court of Policy passed the Compulsory Education Ordinance of 1876 (nominally still in force), and the Board of Education, under its provisions, framed a Code of Regulations which embraced nearly all the changes recommended by the Commission except the last-mentioned. These regulations, with very few alterations, remained in force until 1882, raising the standard of education and morality among the people, attracting ability and intelligence to the teaching profession, and spreading light and knowledge. But Sir HENRY TURNER IRVING came, and with him the good prospects of Education were blighted. Being alarmed at the amount of the Education Vote at a time when the Colony was threatened with bankruptcy, Sir HENRY precipitately passed through the Court a new Code of Regulations, sweeping away at once the Training College for Teachers, certificate qualifications, individual passes of children, and special grants in aid of rents, repairs and the building of new schools, thus putting the Colony more than twenty years backwards in its slow and laborious educational progress. The 1882 Regulations failed most lamentably. They failed in the principal object of their creation,—that of keeping down the education vote. As the grant was paid on the average attendance solely, teachers found it to their interest to have as many children as would give the largest averages possible; hence some poor country pedagogue was often driven to the necessity of using extraneous

means, such as furnishing the children of indigent or careless parents with articles of apparel, and hunting out his children from yard to yard and driving them to school; otherwise, how would he secure their attendances? The result was an abnormal development of the daily attendance and the average, and, to the regret and chagrin of Sir HENRY TURNER IRVING, the educational grant increased by leaps and bounds.

But to say that this system failed altogether would be to say what was not strictly correct. It attained some measure of success. It succeeded in raking up and heaping together in one mass all the evils of past systems, and the colony had the gratification of knowing that it had at last sunk to the lowest possible depth of educational depravity. This system lived out its seven years of miserable existence, in due time was buried, and in 1890 the present "BRUCE-AUSTIN system" was introduced in its stead. This code makes no provision for the training of teachers. It provides for the employment of pupil teachers from 14 or 15 years to 18 or 19, after which it sends them adrift to seek other employment, as after 3 years' service they cannot be retained as pupil teachers nor can they take full charge of a school, being under 21 years of age. The grant-in-aid is based on the individual passes of children, the teacher's certificate and the average attendance. The charge of precipitancy could not for an instant be successfully brought against the authors of this scheme, for it was advertised, talked about, discussed and petitioned against for a period of fully eighteen months before it became law, but only with the result of further confirming the Government in their determination to retain the ob-

noxious clauses. Scarcely, however, had twelve months passed after they became law before it was found necessary to mend and patch them, and in 1892 the "Additional Regulations" were passed, repealing and amending some of the most absurd as well as unjust clauses which had been previously condemned, and with which these regulations were hampered and disfigured.

Taking a cursory glance at the Educational Schemes formulated since 1862, one cannot but be struck with the peculiarities of their composition. None of the subsequent regulations are absolutely free from clauses found in previous ones. Had these clauses, however, been only those which gave entire satisfaction, which were based on the experiences of the past, and which were adapted to the peculiar requirements of the colony, praise rather than blame would have been justly accorded to our legislators. But what do we find? In every new code are to be seen clauses which had been condemned and execrated; clauses which were declared prejudicial to the true interests of the colony, and on account of which a change of system was found necessary; whilst those which were looked upon as being beneficial and from which the greatest good was deemed to flow, were ruthlessly swept away and ceased to exist as Educational Rules. It is well-known that education is a science as well as an art, and as a science it has its repertory from which plans could be produced and used as stepping-stones to further advancement. But our legislators did not avail themselves of the recorded experiences of their predecessors to aid them in framing new regulations. It is well-known that the members of the Court of Policy have ever been among the most

opulent, most intelligent and most thoughtful of the inhabitants of the colony; therefore the charge of sordid considerations or want of foresight could not be successfully brought against them. Nor was it indifference or lack of interest in the well-being of the colony, for judging by their public utterances and conduct, the determined stand they now and then make on behalf of education, and the energy they display in bringing abuses to the notice of the Government, one cannot but come to the conclusion that the education of the masses occupies a very prominent position in their thoughts. What circumstances, then, were responsible for the inconsistencies to be found in every code promulgated since 1862? As the legislators were wise, intelligent, opulent, above petty influences or ignoble considerations, thoughtful as well as fully alive to the interests of the colony, they were clearly not responsible for this regrettable state of things which existed and still exists. Further, they were, and are still evidently powerless to prevent or amend them. Apparently, Educational Regulations, good and bad, successful and unsuccessful, ancient and modern, are all written on slips of paper, and together with several blanks, thrown into a bag. When it is desirable to have a New Educational System, the bag is taken from its peg, shaken, and a hand thrust in at a venture to draw out the required number of regulations. This process is repeated until the number of clauses is obtained. Sometimes blanks are drawn, as the clause in the "Additional Regulations of 1892" which provides for the punishment of parents (or teachers?) for the non-payment of school fees; sometimes those which were highly beneficial to

Education, as those in the Regulations of 1876 making provisions for the training and education of teachers; at other times those are left which would be advantageous, such as giving teachers a higher aim than pecuniary benefits for which to work, although the bag is repeatedly appealed to.

In 1876, before the "Commission of Enquiry," it was shown that the system of counting a "pass" to mean "passing in the three R's" was unfair and unjust; yet in 1882 the identical method of calculating the grant was re-enacted. It was distinctly asserted before the above-mentioned Commission, by managers, by teachers, by members of the legal profession, by scholars, by intelligent and successful tradesmen, by some of the most experienced and disinterested in the Colony, that it was absolutely necessary that Teachers should be trained for their responsible vocation, and that evils which then existed were to a large extent due to the prevailing custom of choosing for the responsible position of Teachers the young and inexperienced, men not qualified either in mental attainments, moral habit, or social status, yet in 1882 the Training College for Schoolmasters was closed, the students turned adrift, and the managers of schools driven to the necessity of drafting their teachers from such professional gentlemen as tailors, shoemakers, butlers, grooms and boat-hands. In 1853, the Court of Policy granted exhibitions to the principal denominations of the colony for the training of young men as schoolmasters, but after nearly a quarter of a century's trial it was found so prejudicial to the best interests of the colony, that in 1876 provisions were made for the establishing of one unde-

nominational training school, in which students of every shade of religious opinion could be trained and educated; yet in 1892 a desperate effort was made by the Government, backed by the religious scruples and ponderous influence of the Governor, as well as the sophistry aud debating ability of the Government Secretary and the wide experience and technical knowledge of the Inspector of Schools, to foist on the colony a system identical with that of 1853,—a scheme by which half-a-dozen petty denominational schools were to be established, directly under the influence of the churches; but, to the credit of the elective members of the Combined Court the thing was unhesitatingly rejected.

Looking at the regulations again from another point of view, they are found to be not only very defective, but more or less positively dangerous. Perhaps it may be expecting too much to require that physical training, such as drill, should receive encouragement at the hands of our legislators. It may, on the other hand, be taken for granted that the moral as well as religious training of the children is cared for by the different religious communities; but surely a system of education which is intended to benefit the children of the poor should make provisions for the acquirement of what the poor would need most to enable them to be independent, self-reliant, law-abiding as well as useful citizens;—that it should require the children to be trained in such a manner as would enable them to perform their allotted part in the drama of life with benefit to themselves and credit to the colony! This is an agricultural country; presumably, therefore, the majority of its inhabitants should more or less be agriculturists;

hence every system of education ought to make provisions for teaching the principles of agriculture. Which is more beneficial to our lads—especially those of the country districts—to be able to enumerate without a mistake the Kings of England with the dates of their accession, or to determine the best crops which could be raised on the soil around their homesteads? Which is preferable? That our grown-up girls be capable of solving with ease and rapidity difficult problems in Profit and Loss, or to know the best method of scalding an egg or keeping meat fresh? Yet in none of the regulations for the government of Primary Schools are provisions made for instruction in the A B C of agriculture or instilling into the minds of our girls the principles of Domestic Economy or Cookery? The result is that year by year the schools turn out lads who, for want of knowing better, look with contempt mingled with scorn and disgust on the shovel and the hoe, and spend weeks and even months in bombarding the counting-houses of merchants, or gazing with envious and regretful eye on sallow and consumptive-looking clerks behind the counter of some dry goods store. And the young girls,—the groans of the housekeepers of British Guiana yearly ascend on account of the serious loss and positive suffering endured at the hands of careless and ignorant domestics. But even the direction in which attempts have been made to educate the children, nothing but complete and lamentable failure is experienced in the majority of cases. How can the mind be properly trained and developed by seedy and impecunious teachers who feel their position insecure, who are summarily dismissed should they speak sharply to care-

less and indolent assistants, have a difference of opinion with their managers over church matters, or who should in an evil moment dare to offend some favourite stable-boy or cook? The insecurity of the teacher's position has been the prime cause of the complete failure of the past systems, and while it is not the only reason why the present is failing, yet it is the chief. Indeed, the "Longden System," the best ever formulated in this colony, provided against the summary dismissal of teachers by making the Board of Education then in existence the only dismissing body; but it was charged with prodigality, and instead of rectifying the evils complained of, the whole sytem was ruthlessly swept away to make room for one which was infinitely worse. The regulations of 1862 made no provision for the proper control of the Education Vote by the Government, whilst those of 1869, 1882 and 1890 levied heavy fines on the grant-in-aid earned by the passing of the children, for the non-payment of fees by parents and guardians, at the same time ignoring the advantages to be gained by having a body of properly trained and educated teachers. Is it any wonder, then, that all these regulations failed to give satisfaction? And is it not more wonderful that we are not infinitely worse off in matters relating to Elementary Education?

The Life-history of an Indian.

By the Editor. James Rodway.

HIS father and mother were Acawois Indians who lived over a hundred miles up the Demerara river. Their little village stood on a sandy elevation near the source of one of the small creeks which go to make up the best-known but not the largest river of British Guiana. Like most Indian settlements it contained but few houses, three benabs or oblong sheds with open sides serving to shelter the whole community. It went by the name of "ROBERT'S place" among the few negroes and half-breeds who lived on the banks of the river, but the Indians themselves had never cared to distinguish it in any way. ROBERT was the oldest man in the community—the patriarch—but he had no particular authority nor did it appear that he was ever favoured in any way beyond the others. His real name was Ousaree (the deer), but this was sacred, and not known to any but his immediate relations.

On either side and aback of the settlement stretched that interminable forest which almost covers the northern part of South America, and from its dense shades the little *warawah* (boy) was brought by his mother early one morning. She had retired from the benab a few hours before, leaving her husband asleep in his hammock, and gone a short distance down the creek. Here, the lump of clay-coloured humanity, destined to be a skilful hunter and fisherman, was born. What were the feelings of the mother, whether sad in her loneliness or

joyful that she had given birth to a boy, it is impossible to say. Probably it was a matter of course to her—a part of her duty as a woman, in doing which she neither required assistance nor would have accepted it if offered.

On her return to the benab she lay down with the baby in her arms for a few hours, but her household duties soon drew her forth. Her husband could no more attend to these than she could hunt or shoot. With her babe slung at her breast in its little hammock, she turned over the meat on the barbecue and baked the cassava bread, no one seeming to care for her in the least. Not so however her husband. He must not hunt, shoot, or fell trees for some time, because the child's spirit was still invisibly attached to him and might be shot, chopped, or injured by a fallen tree. Round his hammock, where he sat with a self-satisfied expression on his face, the other members of the community gathered, and he was deluged with advice from the older men. He must be very careful of himself and not go to any great distance, as the little spirit that necessarily followed him would become tired. If obliged to cross a creek on a fallen tree the spirit must have its own little bridge first laid across, and if the father waded through the water too deep for his companion he must make a leaf canoe for it.

The father was perfectly content to carry out his instructions and remained quietly at home for a few days. His wife looked upon it as matter of course that he should do so, even if they suffered from want of meat. It was his duty to see that no harm came to the tender little one, and it was hers to look after the household. She could not help him, nor could he relieve her of any part

of her work. They both knew this and consequently there were never any disputes, squabbles or complaints from one or the other. In this respect the Indian man and wife agree better than the European, the only drawback being perhaps the want of sympathy.

In a day or two the mother was able to work in the cassava field, a mile away from the settlement, to which she carried her babe, who remained quietly staring, or sleeping on his mother's breast, while she did the rough work of chopping weeds with a cutlass. He hardly ever cried, but like his parents took everything quietly. Even when sick, that cross and fretful disposition so common in the children of more civilised races was not apparent. On one occasion the Peaiman was called in. The parents thought their little one was going to die—that an enemy was at work to injure them, or that perhaps the father had not been sufficiently careful in his precautions against injury to the attached spirit. The medicine man came, and by his direction the father made several gashes on his breast, allowed the blood to flow into a gourd and, after mixing with water, gave it as a medicine to the child. Then this wonderful doctor and magician set to work with a will, shaking his rattle and giving a ventriloquial imitation of a wordy contest between himself and the evil one. After determined opposition on the part of the latter, who became weaker and weaker and his voice more distant, the Peaiman, declared that the bad spirit had departed and that his little patient would recover. This fortunately happened in a few days, and the treatment received full credit for the cure.

His babyhood soon came to an end. As soon as

he could throw his limbs about his mother let him sprawl on the sandy floor, where he soon learned to creep. Like all the Indian houses this was infested with jiggers—those fleas which burrow under the skin and give rise to most unsightly ulcers and often dangerous sores. Poor little fellow, he looked miserable enough as he lay naked on the bare sand and learnt that his finger-nails were made to scratch himself when the jiggers were particularly irritating. Occasionally his mother would make a raid upon the pests, picking them out one by one with a palm needle, or a brass pin when she could get one. But even then sand and dirt often got into the punctures, causing sores which lasted for months, and sometimes becoming alive with fly larvæ.

Morning and evening he was taken down to the creek and encouraged to throw his arms and legs about. Before he could do more than crawl he was able to swim, and soon became quite at home in the water. To teach him to stand up and walk, some hucu ants were procured, and, taking one between his forefinger and thumb, his father wonld let it bite the crawling little one and make him strive with all his might to get away. This soon taught him to use his legs and run when he saw one of the ants. Cords were now wound round his legs to give a right shape to the calves and his father made him a necklace of peccaries' teeth. Otherwise he was quite naked and remained so until approaching manhood, when a lap was provided.

A little later he was here, there and everywhere, now stealing the cassava bread or picking bits of meat from the barbecue, and anon swimming in the creek or running about the clearing. He was never beaten by his

parents, but left to nature and the force of circumstances. To a European he looked gaunt and wretched, his skin covered with jigger marks and open sores. Yet he was happy in his own quiet way. He saw all that went on around him and tried to imitate the men in everything. From the time he could reason however he drew the line at woman's work and would have nothing to do with it. Of course his mother helped him in this—she knew what a man had to do and would have thought it wrong in him to help her. His father made him a little woodskin canoe and a paddle, and when only four years old he made long excursions down the creek alone or accompanying the men on their hunting and fishing trips. Seeing the men shoot with bows he asked his father to give him one and soon became proficient enough to make it dangerous for birds to perch in the clearing.

Now and then he shot at some of the half-domesticated animals which lived about the settlement. No one cared if he treated them cruelly—he was in training for a huntsman. Dogs, monkeys, bush fowl, macaws and parrots, were equally marks for his shafts. These however were always on the look-out and generally ran into the bush when they saw him practising. Not being confined in any way they were able to do this and return when the boy had got tired of shooting. He would tease the dogs and sometimes seriously injure them, but no one interfered although these animals were so necessary to the huntsmen.

As a rule few children are seen in the Indian settlements, and the one in which our boy lived was no exception. The Indians are not prolific, and the death rate among the little ones is very great. The girls were women in

everything but age and size, following their mothers in attending to every household duty and not mixing with the boys in any way. Our little fellow had only three playmates and their games were nearly all more or less serious. The only one that could be considered otherwise was a kind of shuttlecock. Corn cobs were stripped, and three feathers stuck in at one end. These were thrown up in the air as high as possible, and the one which gyrated longest was declared the winner. Other games represented the more or less common events of every-day life, such as hunting the labba. One boy represented this animal, a second the dog and the third and fourth two huntsmen. The first huntsman took up his position in a canoe, while the other gave "law" to the labba and followed it with the dog. The labba ran into the forest, twisting and turning here and there, the dog following on his trail and barking, while his companion egged him on. Presently they made for the creek and the labba took to the water, followed closely by the others, while the one in the canoe was guided by the barking and tried to intercept the supposed animal. The play was rather rough, especially when they were all swimming in the creek, but the boys heartily enjoyed it and were for the time transformed into something different from their usual quiet and taciturn natures.

The education of our Indian boy was gleaned almost entirely by himself. Whatever semblance of teaching he received was from his father, who showed him how to handle a gun, bow and blow-pipe. All the rest he learnt by imitation and practice. The only attempt he ever made at writing was to scratch figures on the sand like those on his mother's queyu (bead apron), or out-

lines of conventionalised animals such as were to be seen on the two or three small benches on which his friends crouched to raise themselves a little above the sand and its army of jiggers.

As he grew older he learnt the names of all the game beasts, birds and fishes, and could shoot many of them with his little bow or blow-pipe. The most useful trees became also familiar to him—from this his bark canoe had been peeled, that made the best dug-out, one was suitable for bows or clubs, another best for paddles. He learnt how to find his way through the forest by breaking a twig here and there, and afterwards, by observing the lay of the land, the watershed of the creek, and certain prominent trees. Then his father showed him the old logs in which the agouti and labba liked to hide, and the fruit trees where parrots and monkeys congregated at certain seasons. In the evening he went out with others to set spring hooks all along the banks of the creek, learnt where the largest fish could be generally caught, and hunted by himself for the fat larvæ which infested the palms. These caterpillars, as well as some chrysalids found in the cassava fields, he ate as he picked them, cracking the latter as an English boy would hazel nuts.

Hitherto he had been always called "boy" by his friends but now they gave him the name Yacari (alligator). What use this name could be to him was never considered by his parents—it was customary and the thing was done. Only himself and a few others knew it, and as they never used it, but still called him boy or friend it was apparently needless. If an enemy learnt it he might do him some harm, on the same principle that a witch was supposed to work injury by possessing a few hairs

or other belongings of her victim. Asked for his name on one occasion by a traveller, the boy smiled in a half-sly, half-silly manner, and pretended not to understand, so the stranger called him PETER SIMPLE, or otherwise PETER, which he adopted and always afterwards gave to outsiders as his proper name. This visitor was the first white man he had seen, but the boy, although a little shy, shewed no fear of him and but little wonder at his belongings.

Very little gossip went on in the settlement. Hardly anything was said beyond the few sentences necessary to describe their wants and hunting experiences. Now and again one of the community went to Georgetown and brought back such luxuries as pins and needles, axes, knives, and perhaps a gun. He would describe his adventures and show his acquisitions to the little crowd, who examined everything quietly and listened to his story, now and again giving a few grunts of satisfaction. They were no doubt interested, but to a stranger appeared almost indifferent. That the boys were impressed by these rare events is shown by the fact that they sometimes played at returning from town, imitating the arrival in a canoe, and enumerating the various articles brought. They were however, so effectually moulded by their inherited characters and surroundings that outside impressions had very little influence beyond those of the moment.

Life was a serious thing to the boy. His highest ambition never went beyond the present, for the procuring of food was of such great importance as to dominate everything else. Around him he saw his father and other men skilful hunters and fishers, and he

wanted to be like them. He was told to wait—he was not yet a man nor could he become one until he had gone through the proper ordeal. Of course he wanted to do this as soon as possible, and was proud to show his father how he endured the stinging of ants without shrinking. Once, he took a knife and made several gashes on his breast, on which the men looked approvingly as a proof of courage. The father had missed shooting a deer, and according to custom, thinking that his skill wanted renewing, cut himself over the breast and arms, and rubbed the root of a particular beena or charm into the wounds.

These beenas are the roots of Caladiums and other tuberous plants, a particular species or variety serving as a charm against each animal. They are generally cultivated at every Indian settlement, and are the only ornamental plants cared for by these people. In showing a traveller his collection, an old Indian who knew a little English, said, pointing to one after another; "this abouyah (bush hog) beena, suppose want 'em, a shilling, this deer beena, a shilling, this labba beena, a shilling, and, speaking more emphatically, "This tiger beena—me no sell 'em!" The varieties of *Caladium bicolor* are the principal plants used, that with the suffused crimson leaf being the tiger beena. The bulb of the Belladonna lily *(Hippeastrum equestre)* is specially used for the Maipuri (tapir) and is often found at deserted settlements, looking as if grown for its handsome flowers.

When about twelve years old PETER was considered far enough advanced to undergo the necessary ordeal and become a man. His father prepared a nose beena—a twisted thong of eta fibre the size and length of a coach

whip without the handle. This was well greased by rubbing it over with some fat palm caterpillars and the thin end pushed up one of the boy's nostrils, through the air passage, and drawn out from the back of the mouth. Notwithstanding that the operation was both irritating and painful, the boy never flinched, but prided himself on his stoicism. He was then presented with a knife with which he slashed himself all over the body and limbs, and rubbed in the several beenas which were to make him always successful in hunting. To complete his initiation manouri ants were secured at the end of cleft sticks, which he held in such a way that they could bite him on several places. The pain was intense but the boy never contracted a muscle, so the father at last declared himself satisfied.

Now began an orgie for which the women had been preparing for some days past. Several hundred pounds of cassava bread had been baked, and hollowed logs, a spare canoe, and great earthen jars, sufficient to hold a large quantity of piwarrie, were made ready. Round the different vessels crouched all the women and children, chewing the cassava bread, and spitting the pulp into each until the bottom was well covered. Then water was poured on, the mixture stirred and left to ferment for two or three days, and now the thick brownish liquid was considered fit for drinking. The men reclined in their hammocks and were kept supplied by the women with gourds of piwarrie. A man would drink several gallons in large draughts, continually vomiting and calling for more, while the women and children all took draughts which would appear enormous to civilized people. All were more or less drunk, but

there was no quarrelling, although every one was inclined to talk and boast more than usual.

During the three days that this coming-of-age festival occupied, the young initiate felt very sore, although he strutted about encumbered with a necklace of peccaries' teeth, a feather crown on his head and a belt of rattling seeds round his waist. He had shown his manhood by enduring pain and then by drinking like his elders, but at last was obliged to lay down in his hammock like a log. Through it all however he looked unconcerned and assumed an air of braggadocio, notwithstanding that his wounds were very painful and his internal organs upside down as it were.

After his recovery he took pride in his manhood, but to complete his felicity he must have a wife. Other men had wives and he was bound to get at least one. In the next benab a girl was living, whom he had seen on several occasions, who was foremost in presenting him with piwarrie at the feast, and had drank after him. Now that he felt a wife to be necessary he spoke to her. No long courtship was needed—she was willing, her parents did not object, and the same evening her hammock was slung near that of the bridegroom. A ceremony was unnecessary, promises on either side would be quite useless, she brought another strong pair of arms to his father's benab. and therefore was welcome. Her father had enough women in the house so he did not miss her; had it been otherwise the young fellow might have had to pay for her or take up his quarters in her home.

Now he was indeed a man and took his right place as hunter and fisherman. With his father's gun, he was a

fairly good shot, but as he had no firearm of his own, he was most handy with the bow and blow-pipe. Everything in the benab was to a certain extent common, but as it necessarily followed that only one man could carry the same weapon, he wanted a gun of his own.

A few miles down the river was a wood-cutting establishment, where the Acawoios sometimes worked for a few days or weeks, when they wanted an axe, knife, gun, or what was of more importance to some of them, sufficient rum for a drinking bout. There the young fellow went, and by a few weeks' hard labour at felling trees, procured what he wanted, and had his first taste of the white man's fire water. There also he met with a number of negroes, who, finding him like all his tribe before they come into contact with so-called civilization, free and open with everything he possessed, took advantage of this simplicity for their own benefit. They would beg anything and everything, and at first he gave what they asked for as a matter of course. But, finding that they by no means reciprocated this generosity he soon grew to dislike them, and hold himself aloof from their company.

Returning to the Indian village he settled down to every-day life. To-day was the same as yesterday and the morrow brought a similar round of duties. He went out hunting or fishing, cut down trees for a new cassava field, repaired the thatch of the benab, or put in new posts when the old became rotten. Now and again a new dug-out canoe, and a bow or blow-pipe were required, the making of the first being a most tedious operation lasting two or three months. On his return from hunting he threw down the game and lounged in his hammock until

his wife brought him something to eat. He had done his share and she did her's. Sometimes he was inclined to be lazy and left the house without meat for several days, but no complaints were made. If any one in the settlement had meat there was generally a little to spare for those who had none. There were times however when game was hardly procurable, and sometimes from caterpillars or a heavy wet season the cassava failed. Then the whole community looked thin and half-starved, and the women had to grate mora and greenheart seeds to make a sort of bitter cake. The men would go out hunting and fishing day after day and come home almost empty-handed. This was perhaps followed by a time of great plenty, when the ripe fruits would attract large flocks of birds, and great numbers of monkeys and agouties. Then the thin and pinched looks of the children gave place to an almost bloated appearance in the lower part of their bodies, and they suffered much from indigestion.

PETER enjoyed very good health as a rule. Unlike either white or black man, he suffered little from malarial fevers. But irregularities in eating and drinking—feast, and famine and drunkenness—necessarily produced disorders of the stomach. Then the Peaiman was called in. This half-priest, half-doctor, would tell him that his sickness was the work of a Kenaima—a mortal enemy with a touch of the supernatural. A Kenaima proper is the avenger of blood—one who has taken an oath not to rest until he destroys his enemy or one of the family. He paints himself—perhaps in imitation of a jaguar—and lies in wait outside a settlement, or follows his man through the forest and on the river for hundreds

of miles until he can strike him down with his club. Other Kenaimas are supposed to work by charms and produce every ailment from which the Indian suffers. The first object of the Peaiman was to try counter-charms and drive the imaginary enemy from the neighbourhood. This he was supposed to accomplish by burning certain plants under the patient's hammock to make a kind of vapour bath, rattling his shak-shak and abusing the enemy in the way already described.

PETER recovered and went on as usual. Among his other occupations a favourite one was training his young hunting dogs. They were poor creatures, hardly anything but skin and bone, but very active and intelligent. To teach a puppy PETER would carry it in his arms when hunting, and let him smell the trail of different animals as well as their bodies when caught. If the animal was not quick enough it was fed on the entrails of the game well mixed with peppers (capsicums), and if it failed altogether it was put in a hole and covered with branches and forced to rub its nose in a lot of bruised peppers placed near its head. The burning effects of these were supposed to increase the senses of smell and sight, even PETER himself sometimes applying them to his eyes for the latter purpose.

Powder and shot were obtained by working for a few days now and again at the timber grant. On one occasion PETER went with a party to town, but he felt very uneasy the whole time. They brought down a number of monkeys and parrots, which the Portuguese hucksters tried to get from them for a mere nothing. The leader however, who knew something of their wiles, stuck out for his prices and took care not to have any

drinks before he had finished his business. Then came the buying of tools, a gun, and some beads for the women's aprons, and after that some bottles of rum, with which the whole party retired to the shed where their hammocks were slung, and got drunk. PETER saw a great many novelties, ships and steamers on the river, a railway train, steam sawmills, and a number of large buildings, but he felt little interest in them. They were nothing to him except jarring nuisances, from which he was glad to get away as soon as possible.

As years passed on PETER became an old man. He was still however strong and wiry and his hair black and thick, as it had ever been. Like all the Indians he did not expect death as a matter of course. He had enemies of course, both natural and supernatural, and they might injure him at any time. After a very severe famine, when day after day passed and nothing but a few bitter greenheart seeds could be procured, a season of plenty followed, and the whole community feasted to their hearts' content. Among the rest PETER gorged himself as he had often done before, but this time he became very sick The Peaiman came and tried his best, but the enemy was too strong, and notwithstanding every effort the poor fellow died. His wife mourned his loss and the other women joined with her in extolling his virtues. He had been a mighty hunter and skilful fisherman; there had been always plenty of meat for the barbecue and pepper pot, but now these would be bare and empty. A grave was dug in the floor of his house, and in it was placed the remains of poor PETER, with a number of his belongings, including a bow and arrows and a blow-pipe. He would still hunt and shoot in the spirit world, and

that he should lack nothing his best dog was tied and buried alive with him. Then, as several deaths had taken place, the settlement was deserted, and the community left their benabs to rot and fall to pieces.

Only a few years have passed since ROBERT'S place was abandoned, but already every trace of the benabs has disappeared. The observant traveller will however notice among the scrubby vegetation a few pine-apples and a belladonna lily, as well as two or three other plants which indicate that an Indian settlement once existed on the spot.

Report of Meetings of the Society.

Meeting held Jan. 11, 1894.—Mr. R. G. Duncan, F.R., President, in the chair.

Members present 20.

Elections.—*Members*: Messrs. Thos. Geo. Sweet, James Fred. Green, (Rev.) E. G. H. Caswell, Geo. W. Lane and F. Griffin.

Associates: Messrs. Jas. Fettes and Geo. M. Steele.

The President said it was customary for the new head of the Society to deliver what was called an inaugural address at the first meeting of the year. He felt like the Scottish Bailie that he was not good at making set speeches, but he did not mind making a few cursory remarks. The worthy and learned gentleman who had just vacated the chair said in both his inaugural and valedictory addresses that he regretted that the Society had departed from the strict lines on which it had first started, and become less purely agricultural and commercial. There was no doubt that it had somewhat enlarged its borders, and while still able to discuss agricultural and commercial questions, it might be said to have become a literary and scientific institution with a valuable library, a well-arranged and interesting museum, an excellent reading room and a well-conducted journal. It seemed to him that its present position was the result of circumstances, and he feared that if any determined effort had been made to keep it otherwise, it would have been defunct long ago. It was therefore rather a matter for congratulation, that while the usefulness of the

Society had been extended, it had also been kept alive and vigorous as they saw it to-day. He would refer briefly, first, to the earlier work of the Society, then to its position with regard to agriculture, and finally to the programme for the present year.

This would be a notable year in the Society's history, as it was established in 1844 and was therefore entering upon the jubilee of its existence. Any one who would glance through its proceedings for these fifty years could not fail to be struck by the immense amount of valuable and useful work which had been done. The first President was that well-known and esteemed colonist, Sir Michael McTurk, and in the list of his successors would be found the names of gentlemen who took the deepest interest in the welfare of the colony, and who also had done their share in forming its history and shaping its destiny. The Society had the title of "Royal" given to it by sanction of the Queen in 1845. During its first two years it showed great vitality—papers were read and discussions held on many agricultural and allied subjects, such as the cultivation of land by steam power and by manual labour, thorough drainage by covered drains, analyses of the soil, extraction of cane-juice by maceration, the development of suitable fodder grasses, cane and plantain diseases, new and improved machinery for sugar manufacture, and a great many other interesting subjects. Some of these papers were so useful as to be well worth re-publication at the present time. In 1844 the Society decided to hold an exhibition and applied to the Government for $3,000 to be offered as premiums for the best exhibits of stock, agricultural produce, &c., but unfortunately this amount was not granted, yet it

showed that the Society from the very commencement was fully alive to the value of such shows. In 1846 an anniversary dinner was held, at which the list of toasts extended to fourteen. In the following year the Society was instrumental in getting the appointment of Dr. John Shier as Agricultural Chemist. The work done by that gentleman in experimenting and reporting upon agriculture, drainage, soils, manures, methods of manufacture, &c., was of immense benefit to the sugar industry, and his reports were replete with information as valuable to-day as it was then. It was difficult to judge the fifty years' work of the Society—the colony in general and the sugar industry in particular were deeply indebted to its investigations and discussions.

He would now proceed to deal with the present position of the Society in regard to Agriculture. Unfortunately there was little to be said of anything beyond the sugar industry. He said unfortunately because, although the sugar industry had been the mainstay of the colony in the past and he hoped would be so also in the future, yet there was still a wide field for other agricultural industries. The sugar estates were managed by trained agriculturists with practical experience, assisted by chemists, so that it might be said the planters did not require information from the Society. This however was not the view he took of the matter. There was no doubt that if they met together and read papers and discussed questions of importance they would derive great benefit from the interchange of ideas. Unfortunately they were not easily brought together, each appearing to prefer working in

his own way. But, outside the sugar industry there was still a wide field for the Society. The climate and soil of the colony were well known to suit cocoa, coffee, cotton, rice, tobacco, provisions and fruits, and he need not say that there was abundance of land for all such cultivations. There appeared however to be a great want of confidence in these things and they might well ask to what this was due. On consideration it appeared to be want of capital, want of labour and want of knowledge. There was no doubt that want of capital was an important reason, but was there after all such a dearth of capital in the colony? Recently there had been no difficulty in disposing of the shares in a number of gold-mining Companies, but let them advertise shares in a sugar plantation or in a cocoa, rice, cotton or tobacco estate and he feared no one would be willing to invest. It was not therefore altogether the want of capital which stood in the way. The second reason, want of labour, seemed a more important one. The population of the whole colony averaged about three to the mile and even if only the area in cultivation was taken into account it was still very small. Barbados was densely populated and could well spare a good number of her people. If agriculturists could really depend upon getting labour at reasonable rates so as to perform their work at the proper time, no doubt much greater confidence would be felt. Now, their Society was specially charged to do all in its power to promote agriculture and it appeared to him that one way of doing this was to develop immigration. Personally he was quite satisfied that a perfectly suitable lot of labourers might be obtained from the West Indies, but they must bring whole families and not

as recently, only young men. They must be encouraged to settle down. In regard to want of knowledge, he did not believe altogether in the old adage that "a little learning is a dangerous thing." On the contrary it was often very valuable, but outside the cultivation of sugar he was afraid their peasantry knew nothing of agriculture. Their Society was charged with the disseminating of knowledge in regard to both agriculture and commerce. Therefore it was their duty to spread such knowledge as he believed was wanting. In what way could this be done? Last year an Agricultural College was proposed but after consideration the project was not thought feasible, but he could see no other way unless the Society undertook to carry on an experimental farm where plants suitable to the soil and climate could be grown and knowledge given to all enquirers. These, he considered were the reasons why agriculture was at a discount in the colony, and of the three, the most important was undoubtedly the labour question.

He would now briefly refer to the programme for the year. The first item was the Quelch reception dinner. Every person who took an interest in the colony must have been pleased with the way Mr. Quelch had represented it in Chicago and he hoped the dinner would be one worthy of the occasion and that there would be a large gathering of the members to give "honour to whom honour is due." The next matter would be the Society's Jubilee Celebration which he thought might take the form of a Conversazione. The Popular Lectures would be continued and he hoped gentlemen would willingly come forward and give their time and talent to this interesting feature of their work. Then, an exhibition

would be held in the course of the year, to assist in providing prizes for which the Government had been already applied to by the Society. He hoped that the journal would be conducted as well this year as in the past and also hoped that papers on agricultural and commercial subjects would be read and discussions held during the year. The important question of immigration and all such other matters that came within the province of the Society would have every consideration extended to them, and they would be prepared to promote and develop them as far as possible.

Such, he said, was an outline of what would be aimed at during the year. They might be able to do a great deal more or might perhaps do less. He did not like to make large promises and he submitted the programme remembering humbly that

> "There's a divinity that shapes our end,
> Rough-hew them as we will."

The Hon. B. Howell Jones then reported on the work of the Agricultural Committee for the previous year, of which he was Chairman. He said the year had been remarkable for its heavy rainfall—the heaviest known in the colony for a long period. On this account it had been exceedingly difficult to carry on cultivation of any kind. The early part was all that could be desired by the planter, but from May to July the wet weather dispelled all hope of a heavy crop for the year. In April a large portion of the colony was overrun by caterpillars which destroyed the leaves of the canes. It was remarkable that these pests did not attack the young plants so much as the older ones and the result was that the canes were stunted, the growth stopped, and ulti-

mately a very poor crop was reaped. From August to October matters improved but in the end the returns were very unsatisfactory. The rainfall of the year might be put down at an average throughout the colony of 136 inches, but on some estates on the Demerara River it reached 154. The prices realised were fairly satisfactory although towards the end of the year there was a falling off in the American market, and now this was entirely closed to the sugars of this colony. At the various meetings of the Committee they had carried on several interesting discussions but he was sorry to say that they had taken place before very few members. This paucity of attendance he found by the records of the Society was no new thing, as it had always been uphill work to bring members to the Agricultural Committee Meetings. They had two outdoor meetings at the Botanic Gardens during the year, and under the guidance of Mr. Jenman and Professor Harrison, visited the experimental ground and inspected the seedling canes and manuring plots. The experiments carried out in the latter showed that phosphates and superphosphates were of little use, the best results being obtained from nitrate of soda and lime. The report of Professor Harrison had not yet been published but when it came out it would certainly prove interesting to those who studied manuring. Among the matters discussed at their meetings were the granting of premiums for improvements in agriculture, the cattle disease on the East Coast, the loss of rum in transit, want of labour, and improvements in the manufacture of sugar. They had also been successful through representations made to the government, in getting assistance to Professor Harrison. They had recommended the

Society to contribute towards the memorial to Sir John Lawes which was done. The Committee had also applied to the Government, with consent of Professor Harrison, to allow the Government Chemist to analyse articles of general interest free of charge. He was sorry to say that up to the present they had received no reply, which was regrettable as the matter was one of great importance. It was not their intention to deal with foodstuffs, which came under the adulteration act, but other matters, of which he would name one—the value of different qualities of megass as fuel. Of course there were other things of importance which could be taken up and prove of benefit to the community generally. This had been the work of the Committee. He trusted that during the present year more interest would be taken in the meetings, and that the members would awaken to the importance of discussing and exchanging ideas on subjects which interested a large portion of the Society and the community as well. He would only say further that as he had been re-elected Chairman he would do his best to promote the agricultural interests of the Society, and hoped that the meetings would be better attended in future and that the results would be worthy of the agriculturists of the colony.

The Secretary reported the following elections of Office-Bearers for 1894, by the respective Committees.

Agricultural Committee—Chairman: Hon. B. Howell Jones; Vice-Chairman: Prof. J. B. Harrison; Secretary: Mr. S. R. Cochran.

Commercial Committee—Chairman: Hon. W. H. Sherlock; Vice-Chairman: Mr. T. H. Glennie; Secretary: Mr. J. Y. Baldwin.

Committee of Correspondence—Chairman : Revd. W. B. Ritchie ; Vice-Chairman : Prof. J. B. Harrison ; Secretary : Mr. J. J. Quelch ; Treasurer : Mr. F. A. Conyers.

The following report from the Commercial Committee was read :—

Georgetown, December 24th, 1893.

To the President and Members
of the R. A. & and C. Society.

Gentlemen,—On behalf of the Commercial Committee, I have the honour to report that at a meeting of the Committee held yesterday to consider the matter of a premium being awarded to Messrs. Da Silva Bros., of Pomeroon—such premium having been offered in the year 1889 and not claimed—it was agreed after consideration,

That, as the Committee thought the preservation of corn by kiln-drying likely to be of great benefit to the Colony, and as they also thought that Messrs. Da Silva Bros. should be encouraged in their undertaking, the Society be recommended to award them the premium of Fifty Dollars as the introducers of a new industry.

I have &c.,

WILLIAM CUNNINGHAM,
Honorary Secretary.

It was moved by Mr. Jacob Conrad and seconded by the Hon. B. H. Jones, that the report be adopted. This motion having been carried unanimously, the Treasurer was empowered to pay the premium to Messrs. Da Silva Bros.

The following report of the Book Committee for 1893 was read: —

Georgetown, Jan. 10th, 1894.

To the President and Members of the
Royal Agricultural & Commercial Society.

Gentlemen,—By direction of the Book Committee I have the honour to hand in the following report of their work during the year 1893:—

In accordance with a resolution of the Committee, meetings have been held on the second Tuesday of every month, and in no case has a meeting fallen through for want of a quorum, or for any other reason.

The Committee believe that the books selected at these meetings have given general satisfaction, and that this is not without foundation may be judged by the rush for the new books when they arrive.

By the courtesy of the Honorary Treasurer they are able to state that the amount spent on new books during the year was $871 84. For this sum 567 volumes have been procured, these varying in price from 12 cents to 43 dollars, the average cost being $1 54 per volume. Of this number 350 belong to the class of Fiction, and 207 to the other classes. While, however, the heavier works are outnumbered by the light literature, in the matter of prices the case is reversed, the former costing $476 41, or about $2 30 per volume, and the latter $395 43 or $1 14. Among the more expensive works added to the library may be mentioned the Century Dictionary, Nordenskiold's Facsimile Atlas, and a file of "The Times" for 1892; which last it is intended to continue annually. A new set of Dickens' Works has also been received and used to replace the worn-out volumes which appear to have done good service. It may be interesting to note that this is the third set which has been bought since 1865, when the present collection was begun, and while they do not consider two sets of these popular books worn out in 28 years, anything very excessive, they cannot but remark that many of the books in the library show signs of very rough handling, Wear and tear must be expected to show their effects on books as on everything else, and they are quite willing to make allowances in the cases of flimsily bound cheap novels. At the same time they must say that tearing out fly leaves for pipe-lights, the disfiguring of books by scribbling, attempts at caricature, and neglect to return loose leaves when they happen to have come out while in the possession of the borrower, show great carelessness at least on the part of *some* of the members.

From statistics prepared for the Committee in May last, by the Librarian, it appears that there has been a great increase in the circulation of books and periodicals during the last four years. This has amounted to about forty per cent. in the case of bound books, fifty per cent. in magazines, 180 per cent. in newspapers, and 150 per cent. in periodicals for the evening. Fiction is here as elsewhere ahead of the other classes of books in circulation, forming 88 per cent. of the whole; of the other classes Geography and Travel come first, followed by History, Biography and Natural Science. This great demand for fiction they have been unable to overlook as may be seen from the number of additions in that class. While however, endeavouring as

far as possible not to disappoint the readers of light literature, they have always tried to get a selection of the best works of the day in all classes.

They have to note that a copy of Bryant's Account of the Insurrection on the East Coast in 1823 has been secured. The copy kindly presented by Mr. Justice Atkinson unfortunately wanted the set of interesting plates which contain the first views of Georgetown. The copy now referred to, however, is complete except that the plan of the East Coast is missing, and as it is rare and almost unique in being the only illustrated work produced entirely in the colony they consider it a very important acquisition. By the kindness of the late Revd. Joseph Ketley several interesting local pamphlets have been added to the collection, and by the donations of other gentlemen the Local Literature class has been enlarged. I have &c.,

J. RODWAY,
Assistant Secretary.

Mr. Conrad remarked that he thought the books should be carefully examined when they were returned, and if found disfigured the delinquents be made to pay for them.

This report was also adopted.

The Treasurer laid over his annual statement, which in accordance with the bye-laws was referred to the Directors to be audited and brought up for adoption at the next meeting.

The Hon. N. Darnell Davis then brought forward his motion, of which due notice had been given, for an addition to the bye-laws to provide for a Chairman and Vice-Chairman for the Book Committee, such provision having apparently been hitherto overlooked. He also asked the meeting to allow the addition after the words " at its first meeting," of " or as soon afterwards as may be practicable," which he explained as being desirable to permit its coming into force during the present year. This being agreed to, the Hon. Mr. Jones seconded the motion and it was carried unanimously.

The following communication from Mr. J. J. Quelch was taken as read:—

Chicago, November 25th, 1893.

L. M. Hill, Esq., Hon. Sec.,
R. A. and C. Society.

Dear Sir,—I stated in my last letter to you that I hoped to write at the end of October, and to send you a list of awards made to British Guiana, which was expected to be completed at that time for publication. Up to the present time the list is not yet ready, though the Bureau of Awards has been holding out promises from day to day. As you may be wondering in the Colony what has become of me, I think I had better not wait any longer for the list. I send you however a temporary statement, the listed part of which, to the number of 46 awards, has been taken from the books of the Committee on Awards. The parts marked "not listed," from 47–53, are also definite awards which have been notified in the daily newspapers, though the Bureau of Awards does not hold itself responsible for their correctness. Besides these fifty three, there are 12 others which have been given separately by the Judges in the Department of Ethnology and Natural History, but as the only exhibitors were either the Exhibition Committee or the B. G. Museum, there is a desire on the part of the Bureau on awards to run these together as one to each of these two exhibitors. I have of course protested against such action, since it would cause 12 separate awards to appear as 2. These awards were given separately, for pottery, boats, hammocks, feather crowns, basket work, birds mammals, fishes, Arrawack Indian, etc., and I pointed out that it would be as sensible and fair to run these together in one term as a collection of Ethnology, as it would be to place together for one award, under the term collection of Agriculture, whatever might have been granted to one exhibitor for cacao, coffee, starch, sugar, rum, etc.

I can't of course say what the result will be, but the whole matter of awards has been such a bundle of injustice and wrangling between parties and nations, that I doubt whether anything satisfactory will result. I don't know a single nation that last May objected to the system that does not now wish it had kept out of it altogether without compromise; while it is said that three or four of the chief nations are so dissatisfied, on account of their treatment by the Bureau, that they intend to refuse to accept any of the awards made to their Exhibi-

tors. We have suffered also, since we ought, on the lines on which awards have been given, to have obtained several more for sugars, rums, timbers, bitters, oils, etc., but though I protested and appealed in each case, it has made no difference.

The medals and diplomas will not be ready nor delivered for months, if indeed within the next year, and all of us foreign Commissioners, are trying to get under the Seal of the Exhibition a statement of the awards made to our countries. This, the authorities promise to give. It is said that even the design of the medal is not yet settled on; and more than 50,000 diplomas have to be hand-written as to the Judgments passed on the individual exhibits. At present in several groups of different Departments, we do not yet know what awards have been made. More than this, it is impossible even now to find out whether an exhibitor who gets several awards in one department, will get a medal and diploma for the whole! Apparently it rests with the Government at Washington, and it is said that only one medal will be given to an exhibitor in each department though the diploma will show how many awards were made to him separately. To increase the number of medals obtainable under this system, you will notice that where possible I have entered things bought by the Exhibition Committee, under the names of the makers who made them for the exhibition, as in the case of Booker Bros. Cooperage, the Coolie jewelry, Mrs. Clegg's fish-scale photograph frame, etc. It was the best thing to do, since the Exhibition Committee in each case had one or more awards in the same department. But this, and other such matters that may seem curious, I must leave over to be explained in person, if necessary. I send you a few clippings from some of the newspapers which give some idea of the chief functions etc., which have taken place recently. One from the "Interocean" on our display of Natural History is pleasing, though it should have been much more accurate. Another from the "Tribune" bears a curious appendix giving me credit for being solely responsible for our display, and for having collected all the exhibits. This I suppose was inferred from my being the only Commissioner—though I trust you will at least not need to be told that I am not responsible for the peculiar gifts of the American reporter. Another paper which I sent to the Colony quite lately bears the astonishing news that I have presented the entire Agricultural Exhibit of British Guiana to the New Columbian Museum. This I assure you was as much news to me when I read it as it will be to you when you read it. The

best of our things that are suitable, as you know, I am sending off to the Imperial Institute. Some other things, chiefly the Natural History and Ethnology specimens, are being returned to the Museum. Some specimens, chiefly woods, shingles, gums, birds, clays, fibres, bush-ropes and cassava I am selling to the North-western University, the Pennsylvania University, and the Milwaukie Museum; and the Columbia Museum has been offered a fairly good set which they promise to buy. The large logs of timber have been a load on my hands. They are so large, heavy and unwieldy that very few people are able to handle them, and the only decent offer for them has been one of $300 from a large billiard-cue and table maker. I have got them to go as high as $350 but that is the most I can get. I was afraid I should have to abandon them or present them to some of the institutions. Still the $350 will not be so bad, the more, especially that the firm will report on the quality and fitness of the Woods. One thing about them that has greatly decreased their value is the great splitting that has taken place in so many of the logs. In this sort of exhibit as in many others, the Fair has taught one a great deal which will be of much use to the Colony for any such undertaking in the future, and I mean to make a detailed report when I return which will help all such of our shows in the future.

The sugars will fetch much less than their invoiced value, since there seems to be no demand for the dark sugars, of which the bags chiefly consist. The jellies and preserves also will fetch very little, sugar being so cheap here and fruit so plentiful. The walking sticks also, except the letter-wood ones, and a few of the others, meet with no sale, the demand being for highly ornamental and well dressed kinds. The rums and bitters I have had to send back. I could only distribute or sell them by paying the duty, which came to considerably more than I could get for them. The bottles alone are worth the sending back, so I would not abandon the spirit to the Government as I might have done. The gold nuggets of Mr. Carreiro got an award as you will see by the list, but I could only get them sold by having them refined down, and getting the value of the gold, and as this might have fallen a good way below the value put on them, I thought it better to send them back, and Mr. Carreiro can do as he likes with them. Seven sample nuggets were taken out for testing and for examination, but as they contained a good deal of quartz, I imagine they will make very little difference in the weight. The box has been sent, sealed, to the Geo.

Christal Firm at New York for shipment to Georgetown, and it is addressed to Mr. Rodway. There is so much robbery and burglary about Chicago, and on the Eastern route, that I felt it safer to send them off than keep them by me and bring them myself. The Portuguese needlework I am sending to the Imperial Institute. The duty on them amounted to 60 per cent., and though many of them had been promised, I thought it best, under the circumstances to cancel the bargains.

Of our miscellaneous odds and ends, we shall sell but little. While the Fair was on, I did not part with things by paying the duties on them because it would have spoiled the appearance and arrangement of our exhibit, and since the Fair has been over there has been nobody to buy. On the 1st day of November, the Show was totally dead, and altogether deserted except by those who had work there. The change was absolute and sudden, and since then it has only been changed by the breaking up, packing and transportation. The weather lately has been awful, 34 degrees of frost, a condition unknown for 21 years, and apparently brought about to strike terror into the hearts of the tropic folks. The big buildings are like giant refrigerators and work is terribly delayed, for in a little while one is chilled through, and there are no means of warming oneself. At present I get on pretty well, but it makes me horribly drowsy.

Just now I can say but little as to when I may be able to finish up here and get away. I am afraid it will not be till the middle of December or after. It took more than three weeks to get them through the offices of the Appraisers, the Examiners, the Liquidators and the Main Offices. Separate lists in triplicate had to be furnished of all articles to be exported, of those for the different Universities and Museums and of those for consumption according as they were free or dutiable; and as nothing could be done with the things in the meantime, you may form some idea of the conditions of our work. Foreign representatives wrote and stormed, it made no difference, it was the law laid down for all articles imported into the United States, and now that the Fair was over, it was of no value that we were here by invitation. For the first time I have regretted I ever came up here as Commissioner. It has been a matter of constant delay and annoyance. The Custom house was swamped with work of course, since all wanted to get through at once. The offices are all short of hands for the press of work, and many of the men don't understand the regulations they have to carry

out. More than this, nothing can be packed except in the presence of a Customs' inspector, and the staff is so small, one often has to wait nearly a day for one. It is useless having many men working for they would be idle the greater part of the time. When this bother with the packing is over, which I have only just indicated since there is infinite red tape about the special cases in which things came and the serial number under which they were entered—I shall have a further bother while waiting for the passage of the invoices of the different cases through the Customs, and in entering the cases for transportation. By then I imagine it will be near Christmas.—Some don't expect to get away till January. Meantime one has to wade through snow and slush, and to work in a bitingly cold atmosphere. Soon I will write again to say how things are going; but at present it is horribly unsatisfactory and takes away all the previous pleasure.

Very truly yours,

J. J. QUELCH.

The thanks of the Society was accorded for the following donations :—

To the Library,—from Hon. Dr. Carrington, a portrait of the late Bishop Austin; from Hon. N. D. Davis, "The Constitution of Grenada," by Wm. Darnell Davis; from Mr. F. A. Conyers, The British Almanac for 1832, and Georgetown Postal Guide, 1863.

To the Museum,—from Mr. G. H. Hawtayne, "A Ballad," printed for the use of the blind; from B. V. Abraham, a fine specimen of Locust Gum, two pieces of gold-bearing quartz from the Cuyuni, and a curious log of lignum vitæ.

The meeting then terminated.

Meeting held February 8th.—Mr. R. G. Duncan, F.R., President in the chair.

Members present 14.

Elections.—*Members*: Messrs. G. F. Powel, H. von Ziegesar.

Associates: Messrs. S. E. Barnes, John McG. Marshall, Robt Dinzey, James McInroy, C. A. Huntingford and C. D. King.

The proposition of the Board of Directors, that Mr. J. J. Quelch be elected an honorary member, was laid over according to rule.

On behalf of the Directors, the Chairman informed the meeting that it had been decided to celebrate the Jubilee of the Society in some suitable manner. On the 16th of March ensuing it would complete the fiftieth year of its existence, but as that date fell on a Sunday, they proposed to hold a Conversazione on some later day. The Book Committee were deputed to prepare an exhibition of rare books and other relics of the past, and it was for the meeting to suggest a Committee to arrange other matters connected with the celebration.

Mr. Jacob Conrad moved and Capt. A. Duncan seconded—

"That the Directors appoint a Committee to arrange for the Jubilee Celebration."

As an amendment it was moved by Mr. Hargreaves and seconded by Mr. Mackay, "that a Committee for the purpose be now elected." On being put to the vote the amendment was lost and the motion carried.

The Honorary Treasurer laid over his Financial Statement (annexed) for 1863, which was adopted.

He then moved in accordance with the rule, "that the surplus funds, amounting to $739 52, be placed in the hands of the Directors to be used in any way they think best for the benefit of the Society." This was seconded by Mr. Gillespie and carried unanimously.

The following report from the Committee of Correspondence was read and taken for notification: –

To the President and Members
of the R. A. & C. Society.

Gentlemen,—By direction of the Committee of Correspondence, I have the honour to report as follows:—

1. That, at a meeting of the Committee, held yesterday it was decided to hold the next Horticultural Show on Thursday June 21st, and as the weather would be uncertain at that time to have it in the Town Hall or some other building. It was also agreed that a circular be issued asking the Chairmen of the village councils and the clergymen in the country districts to assist by forming sub-committees in the villages, and to hold shows one or two days before that of the Society, for the purpose of bringing together the best exhibits.

2. At the same meeting it was also agreed to recommend that the Society purchase a Marquee for use at the Annual Horticultural Shows. This they believed would be less expensive than building sheds on every occasion, and they also thought it could be hired out so as to further reduce the cost.

I am, &c.,

J. RODWAY,
Actg. Secretary.

The following letter from Mr. Quelch was taken as read and given over for publication:—

Chicago, December 10, 1893.

L. M. HILL, Esq., Hon. Sec.
R. A. & C. Society.

Dear Sir,—I wrote to you at the latter part of last month, but as I can give you more exact ideas now as to my movements and doings before I get back to Demerara, I send off this for report. In my last I explained at length the reason of our delay in packing, and the vexatious requirements of the Custom House in the matter of papers before we could pack anything, Since we got through, we have been packing up as quickly as circumstances will allow, though as everything has to be packed in the presence of an Inspector, and it is not by any means easy to get one to be present, there has been a considerable amount of unnecessary delay in the matter. Besides this I have been a good deal occupied in picking out miscellaneous sets of things for Museums,

University Institutions and Schools, each sample requiring detailed labelling, and thus taking up a good deal of time. Add to this the delay from the intensely cold and horrible weather we have been having lately, which has made it quite impossible to work for any length of time in the great cold buildings, which are in reality huge refrigerators, and you will have some idea of the conditions for work, and I think you will recognise that it has to be but slow at the best The weather has been awful lately—for days the temperature being at zero, with very heavy snowfall, and going to 38 deg. below freezing point. Since then there have been alterations of thawing and freezing; and the streets, and especially the Fair grounds, have become quite tiresome and even dangerous for walking, owing to the slippery pavements and glassy masses of ice. Owing to the huge piles of snow on the acres of roofs of the big buildings, work in them is becoming in many parts quite a dangerous matter, for the roof is giving way continually in different parts. In such enormous buildings the sheets of glass are naturally very large and heavy, and it would be certain death to get a blow from even small portions as they fall from the great height. In the Agriculture and Manufactures buildings, great areas of more than, in some cases, 200 feet in length, collapse at once. No effort is made now the Fair is over to relieve them of the weight of snow, and as the upper portions slide, and congregate lower down, the glass has to give way. These are the amenities of the end of the Great Fair. In February and March, when I came up, the conditions were somewhat similar, but then they did attempt to clear off the snow and to preserve the shelter; the Fair was yet to be then; now it is over, and it would cost too much!

I hope to be finished with all packing by the end of this week; but then there will be further delay in getting the packed lists through the Customs and waiting for permits for transportation, and for a car to take the things through to St. John's. It seems to me to be the consummation of red tape that when we have already made out and passed through the Customs, triplicate lists of our things, shewing what was to be done with each individual item, however small, in the exhibit before we could pack,—we yet, after packing, have to submit new lists, of the contents of each individual case, and wait for permits to move even though each thing was packed in the presence of an inspector. Such is the course, and all have to go through it who send away things. In our case, where some of the things go to one place and some

to another of course, it is worse. The crush of work in the Custom house is immense, and the delay is of necessity great, where so many forms have to be gone through. More than this I have to move all our ethnological things, for export, over to the Agricultural Building, before I can pack them; and this is the simplest way under the circumstances I

A good many of the representatives of foreign countries will be here till February and March before they will be able to close up their work. Most of the Chief Commissioners have already gone away, leaving the packing and such like arrangements to be carried out by their Secretary or Assistant Commissioner. The Jamaica section has just lately been finished, but then they had exhibits only in one building, in Manufactures, and they had little packing to do, since the greater part of their exhibits was either sold for what it would fetch or given away. Mr. Vincent of Trinidad has not yet gone away—he has had to wait a very long time for transportation papers but is now free and likely to get away soon, though even then he has to leave the few packages that have to be sent away, in charge of some agent here. There is so great a difficulty in getting cars to take away the packed goods that I may have to do the same thing, for if I stay here till our things are actually sent off, it might not be perhaps till a long way into January. However for the present I wait and see how matters go.

As regards selling our things that were not to go back to Demerara or to England, we have done better than I expected. As will be seen from the statement I submit to Mr. Conyers, as Treasurer, I have in hand $902 29 from sales, besides the money sent by the Imperial Institute Committee, the greater part of which will also represent things sold. As the original funds are exhausted, current expenses are being defrayed from the money from sales. From this same sum, the railway freights on the stuffed animals, books, etc., will be paid, the other things such as came by St. John's being returnable free to that port by arrangement made by the shippers, as they have lately notified me. I hope to have another $300 for sales of ethnological objects to the Columbian Museum—but it is not yet settled. Besides, there will be $35 from the Exposition Company as rebate on the sum charged by them for storage of packing cases. Before we could get any packing cases delivered we had to pay a storage charge of more than $67, but as this was in excess of the original rate agreed upon, we claimed rebate, and we shall get back about $35.

Besides my own personal expenses and those for the Indian, there are the charges for Carpentering, etc., and also what are called "Terminal Charges." A rate of 6 cents per 100 lbs. has to be paid to the Fair for the handling of our exhibits, transporting them from the cars to the Exhibition space allotted to us, and now for the taking away and packing in the cars of whatever things have to be exported. Considering they had to handle our very heavy timbers in the beginning, I am afraid the Terminal Charges will be a pretty big bill.

Of the things that are going to the Imperial Institute, I am forwarding to Mr. Ohlson, a very detailed invoice, and a copy of this I shall submit to the Committee when I return. When they will get to St. John's I don't know. I send them back that way because so far they are entitled to free return, and the "Furness" line of steamers takes them thence to England at the rate of 12 cents per cubic ft. The transportation facilities are most unsatisfactory: there are dozens and dozens of carloads of stuff, that are waiting here that have been packed up for weeks, and cars can't be got for them.

As regards the Awards business, my last letter gave as much detail as you will want in the matter of entry and final results—except as to manufactures. These lists have since come out and we have additional awards as follows:—

Max & Co.—Essence of Tonka.
Coolie Colonist—Jewelry.
Portuguese Lady Colonists—Art Needlework.
" —Embroidery and Laces.
Exhibition Committee—Artificial flowers, from scales, shells, etc.
" —Walking sticks.
Park & Cunningham—Letterwood canes.
Booker Bros. & Co. Cooperage—tubs and vats.
Mrs. and Miss Waby—Art work in Job's tears.
Mrs. Clegg—Fish scale work in Photo. frame.

Before the Awards were announced, the Bureau on Awards moved to Washington, against the protests of all the Foreign Commissioners, and in spite of all the pledges and promises previously given for time for appeals and such like matters. We cannot get certified lists of Awards, and up to the present there has been no official publication of the Awards given. No medals nor diplomas will be ready for a year or so, and the whole matter is one tangle of confusion. France is the only country that can laugh in the matter, for she never consented to

enter any of her exhibits for Awards, in spite of the modifications that were made to suit the foreign Commissioners when they protested last May as a body. The statement is made in the papers to day that certified lists of Awards for each country have been prepared and will be delivered to each foreign Commissioner, but up to the present we have no official notification in the matter. It is said the lists have been much reduced, several awards which had been given by the international board of Judges having been struck off; but as a body, we are at a loss to understand this, since nobody but the Judges can give or take away awards, and the Judges have been disbanded. It seems useless to write to the authorities on the matter, we get no redress; and we had to move a formal protest against such treatment, in our last meeting, and to have it entered on our minutes that we might be able to show our Governments the peculiarity of the situation. To this end also, we had the minutes of our meetings printed to show how through the whole Fair, we were always struggling against unjust or stupid officialism. This will cost us each $10 for the smaller Commissions, the larger of course more.

You might please notify the Book Committee that I have not forgotten the volumes they wanted. *The World's Columbian Exposition Illustrated*, is only completed in the December number, and it was no good to get it before. By the bye the last number has a whole page illustration, a very good one too, of the exhibit of animals of British Guiana. Of course we paid nothing for it. They asked me to group the animals from different parts of the Court, one day, and the whole composite group comes out very nicely. The reports of the *World's Congress Auxiliary* will not be completed for some months, many of the parts not being yet sent to press. What I can bring with me, I will, together with a number of catalogues, etc., from the various sections and countries at the Fair.

I have bought up a few lantern slides of some of the buildings, parts of the grounds, and other views of the exhibition, in case they might come in for illustration of any talk on the subject: but the slides prepared are by no means complete, though they would help to give a very fair picture of the Fair.

You will have had telegrams and notices of the revision of the tariff and the changes made, particularly in the sugar duties. I believe that the West Indian and Guiana exhibits have had a good deal to do with this. Jamaica, Trinidad and Demerara all had good exhibits, though

certainly ours was considerably more complete than either of the others, whether as regards the higher or the lower grades; and we spared no opportunity of pointing out the effect of the bounty and of protective duties. In summarising the practical results of our exhibit for the "Tribune" at the close of the Fair, this was one of the chief things that I mentioned as being the probable result, and since then, it has taken place. In very many other ways I believe the Colony will eventually feel the practical benefit of the participation in the Exhibition.

As to my departure from Chicago, I cannot definitely state a time, but I do not anticipate being able to get away until about the 25th or 26th. As soon as I properly can of course I shall do so—the weather is not such that I should care to be here longer than I can possibly help. Trusting that all matters are satisfactory.

I am, very faithfully yours,

J. J. QUELCH.

The Honourable N. Darnell Davis gave notice of motion as follows :—

"That the sum of $200 be paid from the funds of the Royal Agricultural and Commercial Society of British Guiana, on the award of its Agricultural Committee, to such person or persons as shall, by the 30th of September next, inform the Society of the most advantageous way of colouring rum for market, so as to produce at the same time the least degree of obscuration."

Mr. Hargreaves gave notice of motion as follows :—

"That Rule 8, Schedule B., be altered, by expunging the words 'or in the gallery'."

Mr. Quelch then addressed the meeting in reference to the Chicago exhibits. The diplomas and medals awarded to exhibitors could hardly be expected to arrive within the next year. Those exhibits that were to be returned had been despatched before he left Chicago. but on account of the congested state of the traffic could hardly be expected for a month or two. Many of the things might have been disposed of had it not been for the high duties demanded, which were enforced even if the articles were thrown away. He was glad to say that

after paying all expenses there would be a balance, which he expected would amount to six or seven hundred dollars.

Mr. Daniel (the Indian who went to Chicago with Mr. Quelch) by permission, thanked the Society for the benefit he had derived from the sight of the World's Fair. He intended to record his experiences in pamphlet form, and would present a copy to the Society when it was ready.

The thanks of the Society were accorded to Mr. W. H. Hinds for a copy of the "Echo" Almanack for 1894.

The President gave notice that Papers on agricultural subjects would be read at three ensuing meetings of the Society as follows:—

March—Messrs. Llewellyn Jones and T. N. King.

April—Messrs. E. C. Luard and Jas. Gillespie.

May—Messrs. R. G. Duncan and S. R. Cochran.

The Royal Agricultural & Commercial Society of British

RECEIPTS.

To Society's Funds, 31 December, 1892				$ 660 02
„ Subscriptions—				
Lady Members ... ...$	70 00			
Ordinary Members ...	1,746 67			
Country Members ...	398 00			
Associates	1,166 25			
Arrear Subscriptions ...	17 50	$ 3,398 42		
„ Rents		2,543 00		
„ Catalogues		21 84		
„ Interest on Hand in-Hand Scrip to 30th June,1893 ...	42 00			
„ Profit from Hand-in-Hand on Insurance do. ...	382 77	424 77	$ 6,388 03	
			$ 7,048 05	
„ Balance in Hand for Columbian Exposition 31st Dec., 1892...		$ 5,585 50		
„ Received from the Government (balance of vote)		10,000 00		
„ Sale of Hand-books & Refund of Insurance		505 86	16,091 36	
„ Govt. Vote-in-aid of Museum, in hand 31st Dec., 1892 ...		65 65		
„ Amount in hand for Museum purposes 31st Dec., 1892 ...		10 89		
„ Government Vote for the year.		4,500 00	4,576 54	
„ Govt. Vote for Imperial Institute		1,000 00		
„ From Columbian Exposition Funds		40 00	1,040 00	
„ Govt. Vote for Horticultural Exhibition		250 00		
„ Gate money $332 88, Concession of Bar $21, Sale of Shed $50		403 88		
„ Cost of Exhibition to Society...		85 88	739 76	
			$ 29,495 71	

Guiana.—Receipts and Expenditure for the Year 1893.

EXPENDITURE.

By Salaries			$ 2,610 00
„ Periodicals and Magazines ...		$ 579 56	
„ Less Sales of Papers ...		21 00	558 56
„ New Books added to Library ...			871 84
„ Subscriptions to English Societies			46 92
„ Binding			145 68
„ Advertising, Stationery, and Subscription to Local Papers...			336 01
„ Cost of Timehri ... ...$	546 11		
„ Less Sales by Publisher in the Colony $228 10, Less Sale by Stanford, London, and in Colony $39 20 ...	267 30		278 81
„ Repairs to Buildings & Painting			193 79
„ Cost of New Furniture, Repairs, and Hire of Chairs			89 12
„ Insurance with Hand-in-Hand $50,000 at 1¾ per cent. ...			875 00
„ Postages, Petty, Reading and Exchange Rooms Expenses $222 24, Less Fines $ 5 62...			216 62
„ Cost to the Society of the Horticultural Exhibition ...			85 88
			$ 6,308 23
Society's Funds per Balance Sheet			739 82
			$ 7,048 05
Paid out from Columbian Exposition Funds per separate Statement		$ 15,574 39	
Amount at Credit the A/ct. per Balance Sheet		516 97	16,091 36
Paid for Maintenance of the Museum per separate Statement		3,302 76	
Amount at Credit the A/ct per Balance Sheet		1,273 78	4,576 54
Paid to Mr Quelch to Purchase Exhibits for Imperial Institute		800 00	
Paid to Mr. J. L. Ohlson towards Cost of Arranging Exhibits		240 00	1,040 00
Paid A/cts. for Horticultural Exhibition per separate Statement			739 76
			$ 29,195 71

Meeting held March 8th.—Mr. R. G. Duncan, F.R., President, in the chair.

Members present 19.

Elections.—*Honorary Member*: Mr. J. J. Quelch.

Ordinary Member: Captain A. W. Baker.

Associates: Alfredo V. Gonsalves, John Adie, Antonio Gomes, Arthur M. Cleveland, R. G. Allder, G. T. O. Hughes and Hugh Francis Sproston.

The President stated, on behalf of the Directors, that they proposed to submit Mr. F. A. R. Winter, for election as an honorary member. Mr. Winter joined the Society at its inauguration in 1844 and was the only original member now living. He spoke of resigning the other day, and the Directors thought they would propose him as an honorary member so that the connection should not be broken.

The President read a letter from the Hon. Dr. Carrington, informing the Society that as he was leaving the colony for some time he tendered his resignation of the office of Vice-President. To fill the vacancy thus caused the Directors proposed to nominate the Hon. A. Weber at the next meeting.

The President also informed the meeting that the Book Committee had elected Prof. J. B. Harrison and Mr. G. B. Steele as President and Vice-President for the current year.

Further, the President stated that the Jubilee Celebration would take place on Tuesday the 27th inst., when an Exhibition and Conversazione would be held. Any members having relics bearing on the history of the Colony might be good enough to send them in, and the Committee promised that the greatest care should be

taken of them. They already had a number of promises, and he had no doubt the exhibition would be a great success.

The Hon. N. D. Davis brought forward his motion, of which due notice had been given, that the Society offer a premium of $200 for improvements in rum colouring. The necessity for something better than the present system, he said, was shown by the action of certain purchasers in refusing to buy rum by actual strength but by what it appeared after the addition of colouring. This colouring reduced the apparent strength to the extent of one or two degrees which meant a reduction of profit in large quantities, and he thought if something were done to put the matter on a safe basis it would be a benefit of the colony at large.

The Hon. B. Howell Jones said he would be willing to second the motion if it were somewhat altered. Rum could only be coloured by caramel or burnt sugar, and any attempt to substitute other matters would be resisted. He thought the premium should be offered for improvements in the preparation of caramel. The objection to the present method of colouring was that it was very crude.

The motion was then altered by permission to read as follows :—

"That the sum of $200 be paid from the funds of the Society, on the award of its Agricultural Committee, to such person or persons as shall, by the 30th of September next, inform the Society of some improved way of producing caramel, (combined with its economical manufacture) for colouring rum for market and producing the least degree of obscuration"

This having been approved and seconded by the Hon. Mr. Jones :

The President said that the question of burning sugar for rum colouring had engaged the attention of chemists, both in tbe colony and at home. He did not think they could get caramel made any cheaper than at present. Planters here had not been idle in this matter, nor had they spared any expense, but if $200 would induce any one to go into the matter and find a better process he saw no objection to the motion. He doubted very much however whether anything more could be done, as the great interests at stake had already induced the large proprietors to take advice and go to great expense to find better means of colouring all samples alike.

The mover remarked that it was not on every estate that they had the services of an Analytical Chemist, and it had come to his knowledge that while some made rum that was comparatively uniform in obscuration others did not.

The motion was carried unanimously.

Mr. T. S. Hargreaves then brought forward his motion to admit smoking in the galleries of the Reading Room. He thought that if it were allowed, at least in the leeward gallery, it would not be annoying to anyone, and be much appreciated. He could not see that there were any valid objections to this; as for the danger of fire, people smoked in club rooms, hotels and private houses, but he had never heard that Insurance Companies considered smoking as an extra risk.

Mr. Bell seconded the motion.

Mr. Conyers opposed it, because he thought that if once it were admitted in one part it would become general over the whole. He was a smoker himself but he did not care to sit in an atmosphere of smoke.

Mr. Bellairs opposed on the ground of risk of fire. In the Museum were many valuable specimens which could not be replaced.

Mr. Daly said they had gone on a long time without smoking and should continue on the same line. There was not only the risk of fire and annoyance to ladies, but also the nuisance of tobacco ashes.

Mr. Hargreaves replied to some of the objections, and on the motion being put it was lost by a large majority.

On behalf of the Committee of Correspondence, Mr. Quelch reported that preparations were being made for the Horticultural show in June, but up to the present no definite action had been taken; he hoped to be able to give full information at the next meeting.

Mr. T. N. King read the annexed paper on the "Construction and Maintenance of Roads and Bridges in British Guiana."*

The President moved and the Hon. Mr. Jones seconded a vote of thanks to Mr. King for his interesting paper, which was carried unanimously, discussion being left over until the next meeting.

Mr. Llewellyn Jones read the following paper: "A few popular facts about diffusion, with special reference to its present position in Demerara."† A vote of thanks was also accorded for this paper and discussion postponed.

The thanks of the Society were accorded for the following donations:—

To the Library,—from Rev. W. B. Ritchie, "From Religion to Revelation"; from Mr. G. H. Hawtayne, C.M.G., 6 nos. Pharmaceutical Journal.

* See page 25.

† See page 30.

Miss Hawtayne sent a bottle containing fresh nutmegs preserved with leaves &c. to be shewn at the meeting.

The meeting then terminated.

Meeting held April 19th.—Mr. R. G. Duncan, F.R., President, in the chair.

Members present 17.

The Secretary laid over copies of a circular referring to the premium for improvements in rum colouring, which he stated had been distributed in all tropical countries throughout the world.

The President proposed and Mr. Daly seconded, that the Hon. A. Weber be elected Vice-President in room of the Hon. Dr. Carrington.

The Hon. Mr. Weber was elected unanimously, after which he thanked the meeting and promised to do all he could to further the interests of the Society.

Elections.—Mr. F. A R. Winter was elected an Honorary Member.

Members: Messrs. D. McKenzie, H. L. Humphries, Llewellyn Jones and F. V. McConnell and Revd. A. A. Ost.

Associates: Messrs. F. Viera, C. B. Carto, L. Kerr, J. W. Karnar, F. Harcourt, J. Cunningham, J. Mearns, J. L. Jack, A. Hill, and W. M. Hales.

The President informed the meeting that the Government had forwarded a copy of a Handbook for emigrants to the West Indies, with the request that the Society would suggest any desirable alterations and amendments. It had been referred to the Agricultural Committee by the Directors with the result that a few alterations were proposed as per their report.

The following letter from the Committee of Correspondence was read :—

The Museum, April 19th, 1894.

R. T. A. Daly, Esq.,

Hon. Secty. R. A. and C. Society.

Sir,—I have the honour to report that active steps are being taken by the Committee of Correspondence for the furtherance of the interests of the Horticultural Show, which will be held on the 16th August next in the Promenade Gardens, by the kind permission of the Mayor and Town Council. Large Posters with the prize list are being printed for circulation throughout the Colony, together with hand lists of the same, which are to be distributed as widely as possible for the benefit of intending exhibitors, and others who may be interested in the Show. Besides the items enumerated on the Prize List of the last Show, many others, such as Roses, Lilies, Orchids, Palms, Maidenhair ferns, Miscellaneous ferns, Crotons, Begonias, Pepper trees in fruit, Coffee, Cocoa, Rice, Plantain meal, Cassava meal, Corn meal, Tobacco and Bamboo furniture, have been added to the Prize List for this year's Show, and it is hoped that in this way much practical good will result.

I have, &c.,

J. J. QUELCH,

Hon. Secty. Committee of Correspondence.

A communication from the Government Secretary was also read, informing the Society that the sum of five hundred dollars had been voted by the Combined Court in aid of the Horticultural Show which the Society proposed to hold.

The President having stated that Mr. King's paper on Roads and Bridges was open for discussion :

Mr. A. G Bell said, he agreed with Mr. King that the foundations of the roads here were very soft. It had formerly been held that a soft foundation was best, but the general opinion now was the contrary. He would like to point out that Mr. King had not mentioned drainage in connection with the roads, and he (Mr. Bell) took

exception to his remarks on wooden bridges. Mr. King referred to them as primitive and held that iron bridges were much better, but the speaker thought wood most suitable for the shorter spans. In a country like this, with such soft foundations, he doubted whether Mr. King's suggested structures could be erected at the price estimated. The cost of a greenheart bridge was about $600, and if the timber was well-seasoned it would last for fifteen or twenty years. He did not however speak disparagingly of iron as a superstructure for bridges, but rather wished to advocate the use of greenheart piles.

The President said he agreed with Mr. Bell that well-seasoned greenheart lasted for a long time when used in the smaller bridges, and he was rather surprised at Mr. King's estimate of their span of life, which was much less than he judged from his experience. No doubt concrete and iron made excellent bridges, but when those of greenheart could be built so much cheaper the advantages were not altogether in favour of the former.

Their being no response to the call for discussion on Mr. Llewellyn Jones's paper on Diffusion, the President said it was an excellent paper and that he had read it carefully, but had not time to study it minutely with a view to criticism. He was glad to see that it was so well appreciated that no one had anything to say against it.

The Hon. E. C. Luard read a paper on "Open Drainage and Steam Husbandry in Demerara,"* for which a cordial vote of thanks was given.

Mr. Jas. Gillespie read a paper on "Some effects of

* See page 94

the late rainfalls,"* for which the author also received a vote of thanks.

The thanks of the Society were accorded for the following donations :—

To the Library,—from the Government, Ordinances, 1893; from Mr. Llewellyn Jones, Diffusion in Demerara, 1886-90; from Mr. Luke M. Hill, Sugar in British India, 1822, Examiner Newspaper, 1816-19.

The President stated that at future monthly meetings papers on agricultural subjects would be read by Messrs. S. R. Cochran, F. C. Thorpe and W. T. Binnie. There were one or two others in view and he hoped to have one at every meeting.

Mr. Quelch exhibited several interesting pieces of pottery and other Carib (?) relics found aback of Pln. *Mon Repos.*

The meeting then terminated.

Meeting held May 17th.—Mr. R. G. Duncan, F.R., President in the chair.

Members present 12.

Elections.—*Member :* Rev. R. B. Lander.

Associates : Messrs. H. Blackmore and Stanley Sproston.

The Treasurer laid over a list of the members struck off for nonpayment of their subscriptions, in accordance with the Bye-laws, which was directed to be posted in the Reading Room as customary.

The Secretary laid over a letter from Mr. F. A. R. Winter, thanking the Society for electing him an Honorary Member.

* See page 87.

In stating that the Hon. E. C. Luard's paper on Open Drainage and Steam Husbandry was open for discussion, the President said he was sorry there were not more planters present, as it was a matter in which they were greatly interested.

The Hon. A. R Gilzean said he had just come from Berbice, where a steam plough was at work on Pln. *Canefield*. It was the first time he had seen steam cultivation successfully at work in the colony. Many years ago he had made experiments with his uncle but found a great difficulty with the open drains, although he succeeded in jumping them by putting three wheels to his plough. Then the drains got filled, and ultimately he had to give it up because the engines were not powerful enough. His uncle thought deep cultivation desirable, and went so far on *Leonora*, that canes would not grow for some years afterwards. In some things he agreed with Mr. Luard, but he was certain that it would never do to have cane rows running parallel to the drains, as the water would certainly lodge in the middle of the beds. There was no doubt that steam ploughing was the thing if it could be adapted to local circumstances. At Canefield he saw the plough crossing comparatively large drains, two and a half feet wide by two deep, and it did so admirably, but the drains required cleaning by manual labour afterwards at a cost of $2 50 per acre. At Canefield there were tile drains, but these were not depended upon altogether, being supplemented by open ditches on the top of the beds. He did not think that after the experience of Messrs, EWING at Canefield and on the East Coast of Demerara, they could ever be successful with tile drainage. It would be a great benefit if some

proper system of steam ploughing could be brought into use and he regretted that more planters had not attended to take part in the discussion.

The President said it was also unfortunate that Mr. Luard had not been able to attend. It was commonly said that the reports of these meetings could be read in the newspapers, but this was not all, as people must be present before they could have a discussion. The subject was not a new one for in the Society's records they would find many references to it. He had been lately reading the late Mr. W. Russell's pamphlet, and found it interesting. In the earlier days the ploughs were much heavier and clumsier than at present, but even now a great deal was wanting. He was of opinion that planters and engineers should lay their heads together and devise some means of steam cultivation with open drainage. It would be a great saving if this were done, as at present one adult labourer was required to every acre, and he did not think any other cultivation required so much manual labour.

Mr. Gilzean thought the Government might be asked to assist the experiments by a bonus or grant, and the President promised to bring a motion before the Society to that end.

The Hon. N. D. Davis thought that information might be obtained from Holland, the fen districts of England, and Louisiana, where similar conditions to those in this colony existed. The Secretary was directed to obtain such information.

Mr. Gillespie said that the soils of other countries were generally more porous and had more worms in them than those of British Guiana. He did not

think steam ploughing could consist with open drainage.

Mr. Gillespie's paper on "Some effects of the late rainfalls" having also been declared open to discussion :

Mr. Gilzean said the paper was very interesting, but hardly admitted of argument. The facts were there and very unfortunate facts they were, and they had to thank Mr. Gillespie for putting them so clearly before the Society.

The President agreed with Mr. Gillespie generally but did not approve of his objections to drilling in heavy wet weather. His (Mr. Duncan's) experience was that at such times this was the only work they could do, and he did not think the soil was likely to be injured if it were carefully and properly done. He had always been a firm believer in burying trash in dry weather or when he expected it to be dry, but had seen it unsuccessful in wet seasons. Burying it with the shovel was also sometimes succesful. Otherwise he agreed with Mr. Gillespie and thought the Society ought to be much obliged to him for his paper.

Mr. Gillespie affirmed that what he had stated about drilling was the result of actual experience. He knew those fields which were drilled and those which were not and had given the results. He thought the land became poached by drilling in heavy weather. The men could not stand when drilling without doing this. To relieve the land from surface water shovel moulding was, he thought, more effectual than drilling, as well as cheaper, and could be managed when hoe moulding was impossible.

In reference to the Premium offered by the Society for

improvements in the Manufacture of Caramel, two letters from the Melline Co. calling attention to their speciality for colouring spirits, were laid over.

The President stated that the price was prohibitory, the colouring would cost as much as the rum itself.

Mr. Gilzean thought the sample, when it arrived, should be examined by Mr. Von Ziegesar or some other sugar chemist.

The Secretary stated that it was intended to send it to Prof. Harrison, but if there should be enough Mr. Von Ziegesar might also have a sample.

In the unavoidable absence of Mr. S. R. Cochran, the Assistant Secretary read his paper on "Some enemies of our Cane-fields"*, for which a vote of thanks was accorded, discussion being left over until the following meeting.

The President informed the meeting that if no other paper was forthcoming at the next meeting he would himself read one on the cost of sugar production.

The thanks of the Society were accorded for the following donations :—

From Mr. J. J. Quelch, Commissioner to World's Columbian Exposition—A collection of over fifty books and pamphlets.

From Mr. Thomas Watt—Framed portraits of Governors D'Urban and Barkly.

The meeting then terminated.

Meeting held June 14th.—Mr. R. G. Duncan, F.R., President, in the chair.

Members present 17.

* See page 103.

Elections.—*Members*: Mr. John Bridges Laing and H. B. Leggatt.

Associates: Messrs. Philip S. Birch, F. Mason, T. E. Plant, Junr. and Carl Wolter.

The Secretary read the following report of the Columbian Exposition Committee :—

Georgetown. June 4th, 1894.

Thomas Daly, Esq., Hon. Secretary,
R. A. & C. Society.

Sir,—By direction of the Columbian Exposition Committee, I have the honour to report as follows :—

As the exhibits have now been returned and disposed of, as they believe to the satisfaction of all concerned, and as the final statement of accounts of which I lay over copies, has been forwarded to the Government, they consider that their work is concluded and that the Committee may now be dissolved.

They cannot however, separate without remarking that the Colony's exhibit of the Columbian Exposition was a very satisfactory one, and that the representation is likely to do good, in fact, that British Guiana has been made known to thousands of persons who had scarcely heard of it before. At no former exhibition, they believe, were the expenses kept within the amount of the Government grant, and they think that a great deal of credit is due to the Commissioner that this satisfactory result has been attained. The reports of newspapers and private parties all go to show that their Commissioner did all he could to bring the Colony into notice, and they have therefore much pleasure in forwarding the following copy of a resolution unanimously passed at their meeting of June 2nd :—

" Whereas, on the recommendation of this Committee, the late Governor of the Colony was pleased to nominate John Joseph Quelch, Esquire, to be sole Commissioner for British Guiana, at the World's Columbian Exposition, Chicago, 1893, and

" Whereas Mr. Quelch has satisfactorily carried out his mission, and by his energy, tact, and enterprise, not only won for the Colonial Exhibits the favourable commendations of the World's Fair officials and judges, resulting in our having secured a number of medals and diplomas, but made our representation attractive and interesting to people of all nations visiting the fair, so that there is good ground for

believing that much advantage will accrue to the Colony hereafter from the Commissioner's action—

"Be it resolved that the Committee, having before it Mr. Quelch's report, desire to commend his services to the best consideration of the Colonial Government, and respectfully suggest that His Excellency, Sir Charles Cameron Lees, should bring such services specially to the notice of Her Majesty's Principal Secretary of State for the Colonies."

In conclusion I have only to state that I lay over the Minute Book, and Papers of the Committee.

I have, &c.,

J. RODWAY, Secretary,
Columbian Exposition Committee.

The President moved the adoption of the Report and that the recommendation contained therein be forwarded to the Government.

The Hon. B. Howell Jones in seconding this, and speaking as Chairman of the Committee, said he would like to thank the members of the Committee and also the Secretary for their assistance. He thought they would all agree that the representation of British Guiana had been a success and that this was mainly due to Mr. Quelch, who had done his best to advance the welfare of the colony. It had given him (Mr. Jones) much pleasure to serve on the Committee and to know that it had terminated successfully. On behalf of the Committee and himself he wished to express their thanks for the services rendered by the Secretary.

The report was unanimously adopted, and the Honorary Secretary directed to forward the recommendation therein contained to the Government.

Mr. Cochran's paper on "Some enemies of our Canefields," read at the previous meeting, having been declared open for discussion,—

Mr. Quelch said they were all much indebted to Mr.

Cochran for his paper. Many of them knew that weeds and grasses were pests to cultivation, but he thought the worst enemy of all was the moth-borer.

The Hon. Mr. Jones also spoke of the same pest saying that in the last two or three years they had sustained more damage from this than any other plague.

The President agreed that the moth-borer did a great deal of damage to young canes. He knew of fields thriving well in December, and by February or March entirely gone. It seemed to attack particular localities and particular estates; on some the damage was trifling while on others it was very serious.

Prof. Harrison spoke of the shot-borer, which he had seen at the Botanic Gardens. In regard to the fungus of which so much had been heard from Barbados, it was not new as he had known it there for ten years, but he never saw it attack canes that were quite healthy.

Mr. Cochran thanked the members for the kind manner they had dealt with his paper.

Mr. Vyle wished to bring forward a motion to have a reading desk for newspapers placed in the Reading Room to prevent these being monopolised by one person. The President said this would be better as a recommendation to the Directors and requested Mr. Vyle to make his suggestion in a letter to the Hon. Secretary.

The President then read his paper on "The cost of sugar production in British Guiana."*

The Hon. E. C. Luard said he was sure they were all obliged to Mr. Duncan for his valuable paper, and he believed that the whole planting community would thank him when they saw it in print. To have the cost of

* See page 114.

different operations set forth in a clear and concise manner was a very important thing and he might say without hesitation that a great many planters in Demerara were not thoroughly posted in this.

The meeting then terminated.

Jubilee Celebration.

THE fiftieth year of the Society's existence having expired on the 18th of March, 1894, it was commemorated by an Historical Exhibition and Conversazione on the 27th of the same month. The object of the Exhibition was, first, to give some idea of the work of the Society by bringing together in chronological order everything of importance in which it had been concerned, and second, to show a collection of old-time relics, bearing on the general history of the colony. On the whole the exhibition was a success, but great difficulty was experienced in obtaining the loan of valuable articles, for fear of loss by fire or theft. This can be easily understood, and no one would think of blaming the owners if they hesitated to run the risk of losing what was impossible to replace. However, notwithstanding this, the personal application of the Assistant Secretary and several members of the Book Committee brought together a very interesting collection.

In the first class the most conspicuous feature was a collection of portraits of Members of the Society, the place of honour being given to one of Her Majesty the Queen, who has been Patroness since a few months after the institution of the Society, and who is with the exception of Mr. F. A. R. Winter, an Original Member, the only living representative of the first membership. This was one of a set of Royal portraits presented to the Society on the occasion of the Marriage of the Princess Royal, and with several autograph presentation volumes (Speeches of the Prince Consort, &c.) shewed Her

Majesty's personal connection with the Society. Following this came portraits of the Vice-Patrons (Governors of the Colony), Presidents and most prominent Members, among them being two of Sir Robert Schomburgk the traveller, who took a warm interest in the establishment of the Society. The Committee had to thank the Georgetown Club, the Town Council, and several members for the loan of many of these. Near the portraits were arranged a number of interesting documents, including plans of the Society's lot, views of the building, diplomas from different exhibitions, photographs of the exhibits, &c. On the Cabinets were arranged a complete set of the records of the Society together with quite a large collection of pamphlets and volumes published under its auspices. These included catalogues of books, exhibition catalogues, essays and papers, addresses and memorials, circulars, a set of "Timehri," &c. Altogether, this collection made a very respectable show—almost surprising to a few who had been inclined to think lightly of the Society's work.

Among the relics of early members, special prominence was given to a copy of De Candolle's "Prodromus" with the following inscription on the fly-leaf :—

Presented by
Several Members of the Botanical Society,
to
William Hunter Campbell, Esquire
as
a special acknowledgement for the admirable manner in which he has performed the duties of Secretary to the Society since its formation in
1836.
Signed on behalf of the Subscribers
(whose names are prefixed,)
by
Edinburgh, 14th July, 1841. ROBT. GRAHAM.

Besides that of Professor Graham, other well-known names, such as those of Professor Christison and Balfour and Drs. Greville and Maclagan were included in the list of Subscribers.

Pasted in the cover is the following account of the presentation, and as the Society cannot do less than honour the man who virtually was the author of its existence we give it in full :—

BOTANICAL SOCIETY.

DINNER TO W. H. CAMPBELL, ESQ., AND DR. J. H. BALFOUR.

These gentlemen being about to leave Edinburgh, the one for a far distant country, and the other to fulfil his professional duties in Glasgow, a dinner was given to them by the Royal Botanical Society, on Wednesday last (14th July, 1841), in the Café Royal, as a token of the esteem in which they are held by their fellow-members, and of the good wishes which will accompany them to their sphere of action.

About forty gentlemen, chiefly members of the society, sat down to dinner. Professor Graham in the chair, and Dr. Greville croupier. Besides the members of the society, we observed Professor Sir G. Ballingall, and other distinguished scientific friends of the honoured guests present on the occasion.

After the usual loyal toasts, Professor Graham, in a very feeling and eloquent address, which was most cordially applauded, proposed the health of Mr. Campbell. He said that the Botanical Society had much reason to feel grateful to Mr. Campbell for the great zeal and ability he had displayed as their Secretary. To his exertions indeed, and those of Dr. Balfour, the Society might be said mainly to owe its existence. But it was not only in this capacity that his loss would be felt, for as a private friend his amiable qualities and sterling worth had endeared him to every one who had the pleasure of knowing him. He would carry with him to Demerara the heartfelt wishes of all for his success in the pursuit he was there to enter upon. He trusted, however, that while devoting himself, as he knew he would, zealously to his professional duties, he might still find time to cultivate in so luxuriant a field, as that country presented, his favourite science of botany, and enrich the Botanical Society with some of the treasures of that fertile region. The Professor concluded by again expressing the deep regret they all felt

for the loss of so valuable a member, and so respected a friend, but trusted that he would in due time return to his native city full of wealth and honour. Mr. Campbell's health was then drunk with the greatest enthusiasm.

Mr. Campbell, who was much affected, in brief and feeling terms expressed his deep sense of the great honour which had been paid him by so distinguished a meeting, whose favourable opinion he should always consider as his highest reward. He sincerely thanked them for their good wishes, and the recollection of that day would stimulate him to do everything in his power to merit their esteem.

Professor Graham again rose and said, it was his pleasing duty to present Mr. Campbell with a slight token of the respect and esteem in which he was held by the Society. The present was a sincere though by no means an adequate expression of their gratitude to him. The chairman then handed Mr. Campbell a copy of Decandolle's Prodromus, bearing the following inscription :—

"Presented by several members of the Botanical Society, to William Hunter Campbell, Esq., on his leaving Edinburgh, as a special acknowledgment for the admirable manner in which he has performed the duties of Secretary to the Society, since its formation in 1836."

Dr. Greville then proposed the health of Dr. J. H. Balfour, and, after alluding to the important services which he, in common with Mr. Campbell, had rendered to the Society, congratulated him on his elevation to the Chair of Botany, in the University of Glasgow, an appointment to which he was sure his excellent and talented friend will do ample justice. The toast was drunk with great applause.

Dr. Balfour replied in appropriate terms, and after a variety of other toasts the company broke up. The dinner and wines reflected the highest credit on Mr. Dewar, and the coffee, with which the entertainment concluded, was excellent, and a refreshing novelty.

The same zeal and energy displayed in organising the Botanical Society of Edinburgh was brought to bear upon the people of Demerara, with the result that the Society remains to-day a monument to Mr. Campbell, far more conspicuous than the marble bust which stands in its Reading Room.

Another relic of the early members was a copy of Sprengel's "Systema Vegatabilium" with the autographs

of Robert H. Schomburgk and George R. Bonyun, and the following statement in the handwriting of the latter:—

"These volumes of Sprengel were used by the traveller Schomburgk during his expeditions in the interior of Guiana, and were given to me on his departure for England, May 20th, 1844."

The minutes of the Society also contained many interesting autograph letters and documents, the whole forming a set of records which will become more and more valuable to the historical student as the events pass from the memories of the living. Fifty years is not a long time in the history of a country, yet during this period a social revolution has taken place in British Guiana, and nowhere perhaps is this more conspicuous than in the proceedings of the Society. The strict prohibition of political discussion was not a mere formality in 1844; at that time the strained relations of the Government and colonists were patent. It followed therefore that when the Editor of the *Guiana Times* called the Society a "hotbed of politics" nothing less than the expulsion of the offending member (Mr. Emery) was possible.

The general historical collection was of course larger than that of the Society. A fine collection of maps and charts partly lent by the Government, the Hon. N. D. Davis, and J. Rodway, shewed in chronological sequence the progress of exploration and settlement. The earliest, (without date, about 1630?) illustrating Raleigh's voyages, showed the great Lake Parima and City of Manoa, and a chart of the Atlantic Ocean and neighbouring shores (about 1660) might have been used by one of the Skippers of the Dutch West India Company. A fair number of portraits of early Governors and other celebrities and views of places in Georgetown were

shown. Among the former was a set of miniatures of the Backer family, (Albertus Backer acting Governor, 1790) which were particularly interesting. We must also mention Captain Montague Jones's paintings of the "Fight between the Peacock and the Hornet," "Ruins of Fort Island," &c.

The Society's collection of local literature was supplemented by loans, which made quite an interesting show. "Raleana" was of course prominent, the Discovery of Guiana being represented in a number of editions, beginning with Hakluyt and coming down to that of Cassell's National Library. Then came a collection of Biographies of Raleigh, his "History of the World," Essays, and King James's apology for his execution. Among the old accounts of Guiana were several rarities dating from the middle of the seventeenth century, including two in German written to prove that hot climates were more suitable than cold for European settlements, the comparison being made between the New Netherlands (now New York) and Guiana. There were also other works of later date, mostly in Dutch, some with quaint illustrations of two-fingered men, mermaids, and "men whose heads do grow beneath their shoulders." The old plantation system was exemplified by a number of books and pamphlets, including "The groans of the plantations," 1689, and several on the management of negro slaves. The works of late travellers in Guiana included an almost complete set of Schomburgk's publications, and a number of editions of Waterton's Wanderings, Essays on Natural History and his life by Hobson. Several scurrilous pamphlets of half a century ago were also shown, one of them being the

original document laid over "with consent" at a trial for libel. Two or three local novels and about as many books of poems, with pamphlets on a number of local questions close the list of books. The old-time relics included a very large collection of pieces of plate, interesting for their association with worthies such as Governor Bentinck, Peter Rose and John Croal. A goblet "from H. Cooper, Purser of His Majesty's ship *Amelia*, to his much esteemed friend, Mrs. Hester Husbands, as a token of gratitude for her maternal care in recovering him from yellow fever in October 1804," was also particularly interesting. A collection of Dutch silver toys, two centuries old, attracted much attention, as it included almost all the fittings of a doll's house, and of course miniature reproductions of household utensils, some of which are now obsolete. Then came some fine pieces of old Dresden and Staffordshire china, all more or less connected with colonial families, including Governor Gravesande, Col. Goodman, Governor Bunbury and many others. A sampler worked by the daughter of Governor Meertens, and a landscape in fine needle-work, shewed how our great-grandmothers employed their time.

Church plate once belonging to the "Kerk van Demerary" was shown by the authorities of the Presbyterian Church, and Dutch Bibles dated 1788, when service was held in the Court of Policy Hall, carry us back to the time when no Church building existed in Demerara. A Chalice from the Roman Catholic Church, New Amsterdam, dated 1475, together with several beautiful pieces of Church plate lent by Bishop Butler, were interesting both for their antiquity as well as their artistic value.

A relic of slavery days was a writing desk, said

to have belonged to Mr. John Grant of Bachelor's Adventure. When the East Coast Insurrection broke out, in 1823, one of his slaves named Harriet took the desk with its valuable contents and buried it until the rebels dispersed. Among the documents was a power of attorney from the Gladstones (including the ex-Premier), to James Stuart, and another power of attorney, authorising the holder to receive compensation for slaves. There were also several old passports, licences, and a permit to remain in the colony. A Catalogue of the exhibits was printed and the readers of *Timehri* may have copies on application.

A continual stream of visitors inspected the exhibits during two days and the Conversazione in the evening of the 18th was crowded.

ERRATUM.

On page 46, line 6 from top, for evaporation, read evaporator.

*"Changes on Sugar Estates in British Guiana from 1865 to 1894."**

By F. C. Thorpe.

HAVING promised Mr. DUNCAN, our Chairman, to read a paper connected with our Sugar Industry, I felt I was in honour bound to do so; but my long severance from the Society made me feel diffident as to how it would be received, and doubtful as to what subject I could write on that would interest you. My long residence in the colony, my connection as overseer and manager with men who long ago have passed away, leaving, in the words of LONGFELLOW, their "footprints on the sands of time," has left me and others such records that, even with the present low prices of sugar and a run of bad seasons for years, we have heart to continue the strife; I therefore chose for my subject, "Changes on Sugar Estates in British Guiana from 1865 (the year I came to the colony) to the present time." The word 'changes' gives one such a large scope to dwell upon, that I am afraid it is almost exhaustless, and will require great curtailing. For, if one only compares our magnificent city of the present day, with the Georgetown I landed in in 1865, he must be struck with the grand changes and improvements that have occurred since then. The great fire of 1864 had made a wreck of a large part of it. Water Street before the fire was narrow, the widest portion of it being opposite KLIEN'S and the Colonial Company; to-day that is the narrowest.

* Read at the July Meeting of the Society.

There were few hotels or restaurants. HAMILTON'S, afterwards BECKWITH'S, now the Caledonian, JUDY BASCOM's, and Mrs. BAYNE'S, were about the only places where one could get a bed. Then there was the old Ice House, a perfect shanty, to which I often think I see the two old familiar figures, IMLACH and INGLIS, wending their way from the Public Buildings; CHARLIE CAHUAC'S, now the Demerara Club; and for West Coasters, MARY LYNCH'S in the Market, with her pepper-punch and brandy. Great indeed are the changes of to-day in that respect,—we have the Tower Hotel and others that any city might be proud of; wonderful have the strides been since then. Our new Markets, Law Courts, Police Magistrate's Office, Town Hall, new Colonial Bank, Hand-in-Hand Office, the B. G. Bank, the B. G. Mutual Office, the Roman Catholic Cathedral, the English Cathedral, Tram-Cars running through the city and suburbs, where fine residences have been erected, the Botanic Gardens, and I may say above all the splendid sanitary improvements of the whole town, show such a wonderful change compared with 1865, that we are forced to conclude that in these strides sugar has led the way, and that these changes have been but the outcome directly, or indirectly, of the sugar industry.

But, Mr. Chairman, I must now proceed with my subject: "The Changes in our Sugar Industry," and shall commence with the improvements and changes in the manufacturing department as compared with 1865. The amalgamation of sugar estates, which has certainly changed the aspect of the colony in general, rendered a larger plant of machinery necessary; the bounty subsidised beet, which up to 1883 used a large quantity of

cane sugar in its manufactory, was then not the formidable rival it afterwards became; it was the improved machinery and economy used in the production of beet sugar that compelled us to keep up with these changes; and I shall briefly show a few of the improvements in consequence.

In 1865 vacuum pan estates were in the minority, as compared with muscovado. *Haarlem* at that time bore the palm, both as to quantity and quality of output. The late Mr. J. R. BASCOM was then manager, and my estemed friend and old boss, Mr. JOHN T. THORNE, now Magistrate on the East Coast, head overseer; and I know Mr. BASCOM drew in five years commissions on £50,000,—something different from to-day, This estate was one of the first amalgamated estates; it was joined to *Windsor Forest,* which then made muscovado sugar, and of such a quality that I, then fresh from Barbados, felt how far behind Demerara was to that place in its manufacture of that quality of sugar. How changed my opinion is to-day; and if the departed BASCOMS, who either owned or managed the estates that now comprise this fine property, were to see it now, they would also have to exclaim: What a change! *Leonora* was then a muscovado estate, *Anna Catherina* a vacuum pan estate, and indeed one of the first in the colony. Changes again. *Leonora* is the vacuum pan estate with all its fine appliances, and *Anna Catherina* only a part of it, no longer existing as a sugar estate; and so it is throughout the colony. Wakenaam, then so prosperous, is now reduced to two sugar estates, and nothing but improved machinery could have kept them alive; and so far has amalgamation gone that *Anna Regina,* one of the landmarks of the colony, is now

annexed to *Reliance*. In 1865, *Anna Regina* was the leading vacuum pan estate in Essequebo. *Reliance* was only a muscovado estate, but capital and machinery have placed it in the front, and so the head has become but a part of the whole. Many estates that when I came here were flourishing, are but as names of the past, and all from want of capital or pluck on the part of the owners to put the latest and best appliances of machinery in their buildings; whilst others that were muscovado estates, are to-day, from the fact of their having the best machinery erected on them, the leading ones of the colony, for instance *Windsor Forest, Leonora, Lusignan, Providence, Nonpareil, Mon Repos, Taymouth Manor, Reliance, Golden Fleece, Uitvlugt* and others. In 1865 *Haarlem* made 12 tons of first sugar per day, and no second sugar, this latter quality being only made on a few estates; the molasses were sold for exportation, and a certain quantity converted into rum. All the sugar made that year was white, of the best quality, cured for the English market, and fetched 52s. a cwt.; the duty was 10s. 6d., which left a margin of 41s. 6d., or say £2 a cwt., £40 a ton; what a change as compared with to-day! The hours counted as a day's work on that estate were any or every one of the 24, as long as the day's work was done. There was no proper regulation, as there is now on estates, that there should be a sufficiency of mules, punts and water in the canals to supply the engine with canes (and here let me offer a tribute to the memory of the late WILLIAM RUSSELL, whose name or memory will never die, when we remember that to him we principally owe our present water supply). The open battery and pan were not equal to evaporating the supply of

juice from the mill, and so work dragged on; the coal consumption was enormous, 25 cwt. of coal being considered a fair average to the ton of sugar. Now, take *Windsor Forest*, with its present fine plant of machinery; they can make in the same working hours over three times as much sugar, and at such a reduced cost in production that if sugar were selling at the same price as in 1865, the clearances would be princely.

I have taken these two estates for my comparison of the workings of 1865 and 1894, simply because I began my career at *Haarlem,* and was at *Windsor Forest* later on; and their circumstances will apply to the colony generally.

Haarlem, as I have already said, was a vacuum pan estate, making the then best known quality of sugar, and *Windsor Forest* was a muscovado. Their output was, at *Haarlem,* 1,000 hhds. of white sugar, *Windsor Forest* 1,200 hhds. of an inferior quality of muscovado. Let us reverse it and say *Windsor Forest* had the vacuum pan, and where do the great improvements come in? Well, let us take the supply of canes for the mill and the crushing power at that date. The mill had only 16 punts and 3 mules to supply it with canes, and it was capable of crushing canes to give 1,600 gallons of juice per hour, extracting about 60 per cent. of the juice from the canes, but it too often had to hold on for canes, or wait for room in the clarifier loft. To-day the mills, 2 in number, doing double crushing, can crush to give 3,500 gallons per hour, and not a hitch as regards the supply of canes. In 1865 the pan had to work night and day to get the day's grinding converted into sugar: to-day things are so evenly balanced, that with the triples and pan the

juice is converted into sugar with such rapidity, that inversion, the cause of so much worry in sugar-making, is prevented, and the enormous coal consumption that existed in 1865 is now represented by a mere fraction; this, with the large amount of labour saved, gives the planters a corresponding benefit for field work. The old planters would say: What a change!

I shall try, as far as my memory will allow me, to particularise the various improvements that have gradually taken place. I will take the chemical part first. Sulphuric acid was introduced to give the sugar a better colour, and was used in the pan, taken in when the pan was full. This was improved upon in 1871 by the introduction by Col. STEWART and Col. TRUE, of the sulphur box for bleaching the liquor, before or after tempering. Again, Colonel TRUE improved the colouring of the crystals by introducing the use of bloomer, which has kept up the quality of our sugar to the present day. Since then, phosphoric acid has been largely used. This enables the sugar maker to use a large quantity of lime, which destroys the impurities of the juice, and by using the phosphoric acid, the evil effects of over-tempering are destroyed. One of our first improvements in machinery was the juice-heater. This was, I think, introduced by Mr. SMITH at *Ogle* in 1864, but it was not in general use until some years later on. It was a decided improvement on the old clarifiers with trunnions, both with regard to the saving of steam and the better clarification of juice. The WESTON centrifugals were now being introduced in lieu of the old MANLOVE and ALLIOTT, and have proved a great success; this, with the pug mill, curing sugar more rapidly, and giving a

more uniform sample, the old centrifugals being utilised for curing second sugars, for which they are well adapted.

The conversion of condensing engines into high-pressure, gave the planter the benefit of the back pressure steam, which has been utilised in the working of the juice-heaters, evaporators, triple effets, yaryans, and vacuum pans, which are now on most estates in the colony; and here it is time to show where the great economy in steam and labour comes in. But before doing so, I must mention a great improvement that was introduced in, I think, about 1875,—the filter presses, which certainly give at least 5 per cent. more sugar on a ton, besides the great improvement in the distillery in cleanliness, and a better return of rum. The improvements and economy in steam and labour have been effected principally by the improved boilers now in use—"multitubular furnace boilers"—under which the green megass is burned direct from the mills, instead of the old lumbering waggon boilers, succeeded by the compound and Lancashire. The old waggon boiler has entirely disappeared, and the two latter are now only used as auxiliary boilers. With these new boilers, and by being able to use all the back pressure steam, came the introduction of triple and other effets, thus doing away with the old copper wall or open batteries and saving the large expense of keeping up logies, megass carriers, boilermen on copper wall, and boxtop men, all of which represented at least £2 a ton in the manufactory. So far for the old boiling house as compared with the triple and pan room of to-day; and before going on to the curing room, as it was called in 1865, I will touch slightly on the improved crushing power. In 1878 Mr.

RUSSELL began his maceration scheme at *La Bonne Intention*, and this was improved on by him at *Providence*, and I think next at *Anna Regina*; this double-crushing with maceration has since been greatly improved on most large estates, and with such powerful mills as now exist as compared to those of 1865, regulated by the hydraulic gear, I think I am within bounds in saying we extract at least 15 per cent. more juice from the ton of canes than was done then, besides, as I have already shown, burning the green megass directly from the mill.

Going back, then, to the curing house. In lieu of a dirty molasses stanchion, with the old unwieldy sugar hhds., we find the place dotted with fine machinery—pan engines, centrifugal engines, and various pumps—all doing the work that originally was done by hand. We have small boxes or buckets running on truck lines, into which the pan strikes, and which cool the mascuite more quickly, giving at least 2 per cent. more dry sugar from it, going directly up to a hydraulic lift which empties it into the pug mill, from which it is fed into the centrifugals, from thence conveyed by a spiral carrier into the sugar bunk, where it is easily filled into bags by a shoot, instead of the old package the sugar hhd., the bags being easily handled. and as for economy, costing $1 50 as against $5 a hhd.,—the cost in 1865; this added to the saving in manual labour, allows the planter to cure, fill and ship his sugar at nearly £1 a ton cheaper than in 1865. A great many other improvements have been made, too numerous to mention, and combined with fine buildings, airy and lofty, concreted instead of the old broken brick floors which could never be kept clean, we may say a very great change has taken place since 1865,

and I think the few figures I give will be convincing as to the economy.

Firstly.—Crushing, 15 per cent. more being obtained.

Secondly.—Triples as saving inversion, 5 per cent.

Thirdly.—Subsiders, juice obtained, 5 per cent. on day's work.

Fourthly.—Curing at least 5 per cent.; this I consider a very low figure.

Giving us at least 30 per cent. more sugar on a ton of canes.

In labour, fuel and packages, I have shown a saving of £3 per ton of sugar. The making of second sugars has also done much for advancement in manufacturing; and as to the greatly improved distilleries with the excellent return of rum now obtained, with thorough cleanliness, any one can see what a change there has been without even the aid of the electric light. This is not on every estate, but on a good many; nor do I mention diffusion, as this is only on two estates in the colony, but shall proceed to touch lightly on changes and improvements outside of the buildings. A very marked change occurred in about 1873, when the American market was opened to us, for instead of making yellow crystals, a dark sugar without any chemicals in it was made, polarizing 96 per cent. of sugar; these were called dark crystals, or non-chemical. This was a great opening to the planter, who obtained a good ready market for his sugar, most of which he could sell on the spot. I shall here also mention that in 1865 it cost the planter from £25 to £30, to produce a ton of sugar; to-day, on properly regulated estates, £15 is what it costs.

First and foremost were the great improvements made

in the hospitals and labourers' cottages. In 1865, when I came to the colony, a very bad state ot things existed in this respect everywhere. At *Haarlem* there was a wretched barn called the hospital; for nurse there was a coloured woman called SUSANNAH, who could neither read nor write, and an overseer had to go round after the doctor's visit and read the prescriptions, which were written in English. The supply of medicines consisted mainly of calomel, salts, quinine and castor oil; of course there were a few others. As a rule on estates, a jar of black draught was mixed and placed at the head of the steps leading into the hospital, and whoever wanted it helped themselves. For Quashie this was sufficient, but the coolies required gentler treatment. To Dr. SHIER, I think, the first credit is due for the improved buildings, and for a better staff and better treatment in them. In 1873, the Government took over the medical staff, which up to then, had been in the Planter's hands; and I think to-day the estates' hospitals are a credit to the colony. So with the ranges; the well ventilated cottages of the day as compared with 1865, are simply a wonderful change.

Following up the sanitary improvements in hospitals and ranges comes our good water supply. In 1865 the estates depended on the rainfall for water for navigable and drinking purposes, and how many of us can remember the want too often felt of a drink of water! It was a common sight during a drought to see the people straining the muddy fluid through a cloth, and drinking it; I have had to do the same myself. Estates had to send punts up the rivers with puncheons to get water for the people to drink, and everyone was on allowance.

The villagers suffered very much, and I have known it easier to get a glass of beer in a manager's or overseers' house than a glass of water. Estates often could not grind unless they tapped the admiral, that is, took in salt water in their navigable trenches, and I very much doubt if those estates that had to do it ever recovered from the evil effects caused by it. How changed this is now! The letters in the newspapers from the late Mr. RUSSELL, and Mr. ROBERT SMITH of the *Ogle,* may well be remembered, leading to such results as they did, and the Sugar King, with his characteristic pluck, started on his own hook to give the estates in his charge on the West Coast a water supply. This was taken up by others in charge of the other estates on the Coast, inclusive of *Versailles,* and it seems as if a good Providence befriended them, for in 1885 we had such a drought that estates' authorities were only too glad to get work for their people to do; and the West Coast Water Supply became an accomplished fact. I shall never forget the morning that the stop-off at the mouth of the Service Canal was cut. *Hague* was one of the first estates that got a proper run, and we let it down to the very front of the estate, to allow the villagers to get water to drink; our punts up to then were engaged in bringing water from up the river, for the people on the estate to cook with and to drink. Mr. PITMAN, who was riding with me, and whose usual liberality had assisted as far as practicable in giving the villagers some of this water, was equally amused with me at a scene that occurred. As the water ran down the trenches, thousands of the villagers flocked to get it, and many were the blessings we received. A mule was on the dam, and as we passed,

it brayed,—a Barbadian sung out to the others, "Deed fait souly, why de very mules is a blessing of the manager." Since then I am glad to say we have, with judicious care, enjoyed a good supply for both drinking and navigable purposes. I know the East Coast Water Scheme was started in 1875 or 1876, but it was entirely on different lines to that of the West Coast, and as I have not seen it since 1878, when I left *Chateau Margot,* I cannot say when it was finished, but I think, now that the West Bank and Canal empolder scheme is finished, the entire colony is well supplied for every purpose.

Our changes in Agriculture have not been many. The only radical change, or almost the only one, I see is in the use of artificial manure. The first manure used at *Haarlem* was in 1865, when Messrs. CAVAN and LUBBOCK, who represented property now belonging to the Colonial Company, sent some different samples to be tried on the then Rotterdam fields. I do not think many estates used it; to-day it is applied throughout the colony. As regards improvements in field work, I certainly think in 1865 we did a better description than we do to-day. Firstly, the Planter had a better control over his people, the Coolies, Chinese, and Africans being indentured, and compelled to work every week-day; still I think the abolition of the re-indenture system at the time was a wise step. Secondly, he had not to contend with the Planters' curse, bahama and para grass. The land was more virgin and more easily worked.

The last change I shall mention is the great one on our sea shores, and this must include not only the great wash that has occurred, but the immense improvement in the drainage and easier facilities for shipping. In 1865

the courida bush was miles out in front of our sea-dams; to-day what a sad change, and at what an enormous cost have we had to protect our dams! I think it was in 1866 that the wash set in at *Enterprise* and *Nonpareil*. Since then it has come down both the East and West Coasts. Some have had to chuck up the sponge, whilst others have spent more money fighting the sea than their estates would fetch if put up for sale.

Against this we must place the great improvement in drainage, and the easier facilities for shipping on some estates. Locks have been put in, allowing the punts to float to the very doors of the buildings, thus saving a large amount of money on porterage, and also the risk of damaged sugar.

And now, in bringing this paper to a close, I think you will agree with me in wishing for a speedy change for the better in the Cane Sugar Market.

*What the Banana Trade has done for Jamaica.**

By Dr. H. B. Ford.

THE subject I propose introducing for your consideration to-day, is one of such deep interest and vital importance to this colony in the present languishing condition of its export trade, that I fear it is utterly impossible, in a short paper of this description, to do adequate justice to the subject, but I trust that its many omissions and vagueness will of itself inspire sufficient interest in the subject to induce, not only the members of this Society, but the community at large to go more fully into its details, and give it their most careful consideration.

The Banana Industry in Jamaica, which has assumed such vast proportions, owes its existence more to chance than to any well conceived and carefully prepared plans. Incredible as it may seem, somewhere in the early sixties a stray Cape Cod fishing Schooner, *The Mary Steel,* owned and sailed by Captain BUSH, visited the Island during the winter for general trade and carried back amongst her cargo a few bunches of bananas, more for private disposal than in the interest of trade. The somewhat novelty of the fruit in America, induced fancy prices to be offered and accepted ; with the mutual agreement for the supply and disposal of a few extra bunches on the return trip, The mystic word " Banana" soon got passed around and the Schooner's general cargo of tropical produce gradually yielded ever in-

* Read at the August Meeting of the Society.

creasing space to the new craze until it merged entirely into a "Cargo of Bananas." Bananas now became the order of the day, and the trade as an "Industry" had its conception and birth in the Co-partnership of BUSH, MOODIE and SOUTHERLAND of Port Antonio, Jamaica, to grow, purchase and ship Bananas for the American Market, and undoubtedly to these three gentlemen, therefore, does Jamaica owe most of its present prosperity and trade. This firm however was not allowed to enjoy very long a monopoly of the trade they had thus created, for Captain BAKER soon entered upon the field, and finding a ready market in Boston, easily induced some Fruiterers there to finance a separate and independent venture of which L. D. BAKER & CO. was the outcome, with Headquarters at Port Antonio and Boston: while Messrs. JOHN E. KERR & CO., of Montego Bay, boldly entered the field with steam, compelling BUSH and BAKER each to follow, which they did with auxiliary steam schooners and later by steam entirely; and thus from the lowly cradle of a few stray schooners of the Cape Cod fishing Fleet, calling at uncertain periods, did the trade demands increase by leaps and bounds until these early pioneers were soon left behind in the race of competition, and 133 steamers of various nationalities now represent more eloquently than words can express the extraordinary growth and vastness of this steadily increasing industry.

In the early days of the trade none but small settlers planted bananas, which they carried to the sea-beach, where the Captain of the schooner or his representative sat and paid in cash for each bunch; the prices ranging from 6d, for small to 4/ for large, according to the state

of supply and demand, and when, as often happened during the winter months, four or five and even more schooners happened to be in port together, the demand exceeded considerably the supply and prices would rise to 6/ and even 8/ a bunch. During such periods the crowds of country people streaming down to the seaports throughout the day and night, chatting, laughing, or quarrelling, turned the hitherto dreamy langour of these almost dead seaport towns into bustling excitement and busy activity, and money thus easily got freely went, until the large landed proprietors and semi-abandoned sugar estate owners began to think that the planting of bananas, if beneath their dignity, from its large return justified the condescension, and a paying banana walk was secretly if not openly preferred to a bankrupt sugar estate. At any rate a few fields of bananas if planted along with the cane, "merely as an experiment of course" could not be regarded as a change of allegiance from King Sugar, and the ready cash sales and large profits of banana planting have in every instance proved so alluring and powerful that one by one every sugar estate, even in the fertile and seasonable parish of St. Thomas, from Morant to St. Ann's Bay, along nearly three-fourths of the coast line of the Island, has passed entirely into banana cultivation, making their proprietors the envy of the less fortunate amongst the community, whilst the unfortunate proprietors of sugar estates in other districts receive a corresponding sympathy.

The present condition of the industry is much like most other agricultural undertakings pursued on a large scale under varying conditions of climate, soil and

locality. Jamaica has not much land that can really be said to be suitable for banana cultivation, for although this may seem somewhat paradoxical in face of the apparent vastness and success of the industry, nevertheless it is easily demonstrable and only proves what a grand field is open for trade, where land, climate and shipping facilities are really suited to this business.

Jamaica lies nearly east and west, with a range of mountains running through the length of the Island, varying in height from over 7,000 feet in the east end to 2,000 in the west. The prevailing trade-wind from the south-east drives therefore obliquely across the Island, carrying the rain clouds, which break on the highest peaks in the east, these inducing a certain amount of the rain to fall on the weather side; amounting to some 70 to 90 inches a year in the parish of St. Thomas-in-the-East, gradually decreasing to 30 or 40 inches at Kingston, behind which the mountains only attain a height of 1,500 feet. Immediately behind St. Thomas is the parish of Portland, which receives the bulk of the rainfall, amounting on an average to about 200 inches a year, (while during last November 80 inches were recorded) and following in the same oblique line, the rainfall drops to 40 or 50 inches in St. Ann's, while the next parish Trelawny is invariably parched with drought.

The centre of the banana business is in Portland, which is entirely a mountainous district with hardly any flat land, and with the exception of a few miles of cart-road, nothing but mule tracks, zigzagging up the hills and across innumerable streams and rivers which are often impassable, form the means of communication between

the coast and the interior. The soil of this district, which scarcely boasts of over 200 acres of flat valley land, is chiefly of clay and river stone, upon which the bananas seem to thrive as long as the almost incessant rains continue, but two weeks of dry weather is sufficient to parch and wither them; added to which the furious gusts of wind that frequently rush through these mountain gorges carry wholesale destruction before them; these are some of the difficulties the industry has had to contend with. In St Thomas,' where soil, roads and seasons unite to give the desired requirements, the incessant gales and strength of the daily sea-breeze to which this locality is exposed, lashes and destroys the banana leaves, thereby injuring the plant and often laying whole fields of bearing trees flat on the ground.

St. Mary's is more or less exempt from either mountain gusts and sea-breeze and is perhaps the most favourable locality, being of a hot humid climate, but here also serious drawbacks have to be encountered; a poor marly soil which burns readily in dry weather, and in heavy seasons makes every road an impassable quagmire.

The other parishes produce only in a few favoured spots an ever varying quantity hardly worthy of consideration, with perhaps the exception of St. Thomas-in-the-Vale.

It may therefore be asked how in the face of these natural disadvantages the industry from its infancy to manhood has exhibited such extraordinary development, and to what can the secret of such unprecedented success be attributed? Well, perhaps many circumstances coincide to produce this end, but undoubtedly the talisman

of this success, is almost an unknown quantity in the West Indies. "Ready Money" is the key to the situation, and whether the profits be large or small "Ready Money" means quick returns, and quick returns means trade. Thus vast sums of money are kept constantly in circulation and a man's capital is turned over and over during each year, and although at every turn the actual profit may be small, his annual income may be comparatively large; at any rate the late impecunious sugar planters and peasantry of the districts named, if not now all millionaires, are living in comfortable and independent circumstances. The innumerable neat little cottages and new houses dotted all over the hills, surrounded by small and large tracts of land in bananas, the many wharves and storehouses, new villages and enlarged and busy centres of trade connected by a network of telephone and telegraph wires, even in the remotest parts of the hills, present a more impressive picture of prosperity than either words or statistics can convey. It is not many years ago, even as late as 1880, that little or nothing was known of the interior of the Island, and the few mule-tracks that did duty as roads across the country were seldom used by white people except on an occasional journey. The negroes lived in a semi-wild state, often going about in a naked condition and running and hiding at the approach of a white man. But all this is changed now, for with the continued increase of the area under bananas, many new roads and extensive repairs to old ones were demanded and insisted upon; and the local authorities being unable to cope with the urgent needs of the new industry petitioned the Government, which in 1891,

assumed the management of over 900 miles of these parochial roads, and at once set about the simultaneous reconstruction of them in each district at a cost varying from £100 to £400 per mile. Good roads without bridges being of little service, the Government had to face an outlay of £150,000 for this purpose, which has been chiefly spent in the parishes of Portland and St. Thomas-in-the-East, in the construction of some fine iron and concrete structures varying in length from 80 to 480 feet over the Rio Grande River. At the same time urgent demands were made throughout the Island for railway extension and £1,200,000 was voted for the purpose of increasing the line one hundred miles, the greater portion of which has been brought into operation. Several narrow gauge Tramways have also been projected to tap the rich valleys and act as feeders to the main line. In a few instances such lines are actually in operation, whilst Mr. CLARKE'S Overhead Wire Railroad traversing the Mandeville mountains from Porus to his banana property is worthy of mention. This line was erected by him at a cost of some $40,000, solely for the transportation of his own fruit direct from the fields into the railway shed at Porus and thus avoid handling and jolting in cartage.

The Fruit Companies on their part have not been backward, and beyond the use of private telephones connecting their properties, wharves and buying stations, and the construction of Tramways, have built, and are building fast steamships, specially designed and fitted with warming and ventilating apparatus for the safe conveyance of the fruit in all seasons, while Captain BAKER, of the Boston Fruit Company, which owns some 35,000

acres of land in Jamaica alone, is constructing a dry Dock at Port Antonio, where he already has extensive shops for boat building and ship repairing. He has further been successful in raising some £300,000 in London to further develop his gigantic Banana Industry in all its various branches, while the Jamaica Syndicate with a capital of £50,000 in ten shares of £5,000 each, was proposed, formed and £30,000 of its capital subscribed inside of 48 hours, and cabled to London to Messrs. HAWTHORNE and SHEDDON to acquire certain sugar properties then in the market. Among the gentlemen forming this enterprising Syndicate, was His Excellency Sir HENRY BLAKE, who took one share.

Among the individual proprietors of large banana walks, may be mentioned Dr. PRINGLE, who some four years ago refused £125,000 for his properties, which as sugar estates in cultivation, together with live and dead stock he had acquired for £30,000. Within the last four years he has almost doubled the area under bananas and now loads his own steamers weekly. The extent of the export of bananas from Jamaica at present is on an average between 70,000 and 80,000 bunches a week, and it is not uncommon for 10, 12 and even 14 steamers to clear at a single port in a week during the height of the season between March and June, so that the annual output may be roughly taken at 4,000,000 bunches.

It may not be uninteresting here to mention that early in 1864, the sugar planters in the old House of Assembly began to turn their attention to the possibilities of banana cultivation on a large scale as a profitable undertaking, in place of their fast decaying industry, and a Special Committee was appointed by the House to con-

sider the feasibility and advisability of planting bananas to make flour, but the rebellion of 1865 occurring just at the time the Committee were about to present their report, the matter was dropped and forgotten until some 8 years after, when the Chairman of the Committee, the Hon'ble. JAMES M. GIBB sought the samples which had been prepared by order of the Committee and had them examined, with the result that the flour was found in a perfect state of preservation, and although on the matter becoming known in England, it was proposed to use banana flour for provisioning fortresses, on account of its antiseptic and keeping qualities, the general lethargy and langour that pervaded all things West Indian, effectually prevented any further steps being taken.

There is little doubt that there would be a large field open for this industry and the matter is already receiving serious attention in the neighbouring colony of Surinam, as will be seen by the following interesting account which appeared in the *Sugar Journal* of April 15th, 1894, and which was taken from the *Tropical Agriculturalist*:—

A Mr. HARTOG, who went in the beginning of last year to Surinam (West Indies), is in possession of a method of preparing fine dry meal from bananas and plantains. The chemical analysis of both sorts of meals have proved that the chemical composition of different bananas and plantain kinds is almost identical. The principal stuff the meal contains consists of 80 to 85 degs. of starch This composition induced him to seek the adoption of the meal for purposes where other stuffs containing starch are employed, and he chose, in the first place, the fabrication of alcohol and glucose (grape sugar). As he did not dispose of very large quantities, he was forced to apply to laboratorium experiments that were made at the Government Institute of Alcohols in Switzerland, fixed at

Berne. The gentlemen there made alcohol of meal, and wrote as follows :—

" Il resulte de ce qui précede qu'il vaut tout à fait la peine d'utiliser ces farines pour la fabrication d'alcool. La qualite de l'alcool de farine de bananes peut aussi etre envisagee comme bonne." In the conversation about the object with those gentlemen, they gave their opinion that the value of the meal would at least be that of maize, the starch quantity of the meal being greater, the same opinion was given by some manufacturers of alcohol in Switzerland and in Holland. As proof of how many stuffs can be employed for alcohol manufacturing, it may be said that one not very large manufactory in Holland employs on an average 25,000 tons of maize a year. The same gentlemen, in Berne, made experiments with glucose making, and said :—" Il est evident que la farine de bananes traitee de cette maniere pourrait etre encore utilisee pour la fabrication de glucose," The value of the meal for glucose would be more than one and a-half times that of maize, for maize is not employed for that fabrication, but only dearer sorts of stuffs, as potato and sago meal. A certitude for the employment of the meal for glucose manufacturing can only be given by employing at least a ton of the stuff, but there is very great probability it will also do for that purpose. In the following calculations he estimates the value of meal on the basis of maize, that is at this time being delivered by ship in Europe at £5 to £5 10s. For manufacturing 1,000 tons per year of meal there would be needed an installation that would cost, delivered and fixed on the estate, £2,000 to £2,500. For a second 1,000 tons a similar installation would be needed, for it would be difficult to make larger installations. For this reason it would also be profitable to make the manufactory on the estate itself, for using the bananas and plantains. The fabrication of 1,000 tons will be taken as a basis. Cost of reaping the fruit, preparing it and making the meal, delivered on ship if there is water in the neighbourhood, can be put at 18s. to 20s. per ton ; for freight to Europe, 18s. to 25s. per ton. Thus the average cost of the meal delivered in Europe would be £2 per ton. He said the value would be at least that of maize, or £5 to £5 10s., so that there would rest per ton of meal £3 to £3 10s. So that for 1,000 tons an installation of £2,000 to £2,500 is wanted, and a quantity of bananas or plantains of about the double or the triple of the meal in average 1,500 tons, whilst the revenue would be £3,000 to £3,500. In the above given cyphers all exaggerations are avoided. So it is pro-

bable that the quantity of 1,000 tons can be surpassed, and the most of manufacturing can be reduced, whilst the prices of the meal would increase if it will do for glucose manufacturing.

L. E. ASSER, C.E.

*Diffusion versus Double Crushing.**

By H. von Ziegesar.

WHEN Mr. DUNCAN asked me some time ago to read a paper before the Society about Diffusion, I readily assented as this is a subject which I feel deeply interested in, but I forgot at the time, or did not realize, that instead of addressing you in my smoothly flowing mother tongue, I would have to do so in a language which somehow has always refused to fit in with my native speaking apparatus, I must therefore apologize, gentlemen, if the idiom in which I am about to deliver my views does not always come up to what you would call " choice English."

Gentlemen ! In the following remarks I shall endeavour to show what diffusion has done for the sugar manufacture in this colony up to now, and what it might have done or might do for Demerara.

" Necessity is the mother of progress," we say in German and I find that Englishmen too acknowledge the truth of this old proverb by the similar saying, " necessity teaches many things." Of necessity or rather of distress there is at present plenty in all sugar growing countries, and especially in Demerara, as we all of us know only too well, owing to the depression of sugar prices, a sinking which in all probability will continue for some time and will render the present state of distress even worse. It is to be hoped therefore, that the intelligence of the sugar manufacturers will effect a

* Read at the August Meeting of the Society.

solution of the problem, how to reduce the cost of making sugar in proportion as the prices go down, before the sugar industry of this country has gone to ruin.

The necessity for progress in this direction is perhaps even greater than many of those who suffer from the present distress realize, some mistaking the low state of the sugar market for a temporary calamity.

Gentlemen, there has been one enormous step already made to meet the increased necessity of cheapening the methods of sugar making—this is diffusion.

To enable you to recognise diffusion as an improvement I shall try in the course of this paper, to give you a standard by which to judge for yourselves whether diffusion is a progress or not.

The standard by which diffusion should be measured differs from the one customary in this colony. Here the returns of an estate are measured in the first place by the number of tons of first sugar per acre, which figure comprises the results of the field and the building mixed up in such a manner as to make it impossible to recognize whether they are due to a good or bad field crop; or whether to quality and quantity of the cane or to more or less rational work in the buildings. The next item by which the estate's yield is judged, consists in the recovery of first sugar derived from the indicated sugar in the clarifier juice, which figure rests on the sugar already obtained by the clarifier juice, and therefore such judgments lose sight of the most important recovery in the buildings which is the recovery of juice from 100 tons cane.

You finally go by the number of gallons of clarifier juice required for one ton of sugar. Gentlemen, this standard, though not wrong in itself, is altogether in-

sufficient for measuring any improvement in the recovery of juice from cane, and therefore becomes fatal if it is applied for such a purpose.

I have twice in my life experienced a change of standard measures in public life, and therefore know the difficulty which almost everybody has to encounter in getting accustomed to a new standard. Indeed there were people who would stick to their old modes of measuring until the end of their lives in spite of the laws and Police Ordinances which do not allow of being joked at within the fatherland. This was on the occasion of the introduction of the metric system and the new coinage in 1873.

Nor need this surprise us. We all very likely have a precise idea in our minds about, say, the area of 100 acres, or about the size of a building, the length or width of which are expressed to us in feet, but I doubt whether there are not a few among us who would be puzzled if the same dimensions were given them in square metres and millimetres. Still it would be easy enough for them to transfer the given measure into their own mode of reckoning.

This is not the same with the appreciation of diffusion. It is not merely a matter of turning one standard into the other, but the old standard has to be abandoned completely, and an entirely new one has to be adopted.

According to the usual manner of reckoning in this colony the differences of crushing would be

with single crushing, 62 tons juice, losing 26 tons juice by megasse:
with double crushing, 72 tons juice, losing 16 tons juice by megasse:
with diffusion, 85 tons juice, losing 3 tons juice by megasse.

You can therefore see that by diffusion you gain 13 tons original juice on every 100 tons of cane worked up.

In judging the recovery on juice, sugar, massecuite, and 1st sugar, I introduced the following table recording the results in the buildings under my control.

A complete record of a Mill Factory and a Diffusion Factory will run as follows :—

By Mill (Double Crushing.)		By Diffusion.	
Sugar in the cane o/o = 13.13 =	100·00	Sugar in the cane o/o = 13·13 =	100·00
Sugar in juice obtained 10·74 =	81·81	Sugar in juice obtained 12·69 =	96·64
Sugar in Massecuite obt. 9·90 =	75·40	Sugar in Massecuite obtained 11·95 =	91·01
Sugar in 1st Sugar obtained 7·63 =	58·11	Sugar in 1st Sugar obtained 9·23 =	70·29
Loss Account.		Loss Account.	
Sugar in Megasse 2·39 =	18·19	Sugar in Megasse 0·44 =	3·36
Sugar till Massecuite 3 23 =	24·60	Sugar till Mas'cte. 1·18 =	8·99
Sugar from Clarifier till Massecuite 0·84 =	6·41	Sugar from Clarifier till Massecuite 0·74 =	5·63
From 100 tons cane we received 72 tons juice or 15,000 gallons juice (1·075 sp. gr).		From 100 tons cane we received 85 tons juice or 17,726 gallons original juice (1·073 sp gr.)	
Tons Massecuite ... ... (Pol. 77·2).	12·82	Tons Massecuite ... ... (Pol. 77·0).	15·52
Tons 1st Sugar ... ... (Pol. 96·0).	7·95	Tons 1st Sugar ... ... (Pol = 96·0).	9·62
Gallons Clarifier juice per ton of 1st Sugar=	1886·6	Gallons Clarifier juice per ton of 1st Sugar =	1842·6
Tons cane per acre 28		Tons cane per acre ...	22—28
Tons 1st Sugar per acre	2·22	Tons 1st Sugar per acre	2·11—2·66
Tons cane per ton 1st Sugar	12·57	Tons cane per ton 1st Sugar	10·39
1st Sugar obtained on the indicated sugar in clarifier juice ...	75·8	1st Sugar obtained on the indicated Sugar in clarifier juice ...	75·6

Amongst all my statistic material of mill and diffusion work, I choose such figures as show the recovery from

equal qualities of cane worked up by both processes in this case with 13·13 o/o sugar. That my plan for showing comparisons between both methods holds good also if the cane is of different qualities is obvious; besides I am in possession of figures which show this practically. The yield of 13·13 o/o of sugar in the cane has been accidentally almost identical with the average yield of sugar in the cane during the last five years.

By a glance at the above schedule you will see that from 100 tons cane we obtained 1·67 tons or 21 o/o more 1st sugar by diffusion than we obtained by double crushing = 72 o/o on the weight of the cane.

This surplus of 21 o/o 1st sugar is by no means a mere theoretical possibility, but a practically attainable figure. It has been reached in the buildings of this colony which work by diffusion. That this increased recovery has not been of long duration, and especially that it did not become visible to the outside world by a considerable clearance of money, is exclusively a matter connected with local and intimate conditions on the estates in question, which need not prevent anybody from availing himself of the blessings of a thoroughly good, solid and promising process, independent and unhindered by another's individual drawbacks.

In order to compare diffusion with double crushing, we require to know in the first place, the recovery of parts sugar in the juice. Double crushing gave 81·81, diffusion gave 96·64, that is to say, 18.12 o/o more sugar has been obtained of the sugar in the cane.

Secondly, the recovery of parts sugar in the massecuite from 100 parts sugar in the canes; with double crushing we received 75·4 o/o with diffusion 91·01 o/o, that means

to say an increase equal to 20·7 o/o ; in the third place the surplus on massecuite in tons which is 12·82 against 15·52, being for every 100 tons cane worked up a surplus of 2·7 tons massecuite equal to 21·06 o/o ; in the fourth place the surplus on 1st sugar, which amounts to 7·95 against 9·62 being for every 100 tons cane worked up, a surplus of 1·67 tons 1st sugar equal to 21 o/o; in the 5th place, the recovery of chemically clean sugar in the 1st sugar from 100 parts sugar in the cane which increases from 58·11 to 70·29, equal to 20.96 o/o ; in the sixth place the number of tons cane required for 1 ton of 1st sugar being 12·57 by double crushing and only 10·39 by diffusion ; in the seventh place we see that the recovery of 1st sugar on the indicated sugar in the clarifier juice remains untouched, being 75·8 and 75·6, therefore, useless for showing an improvement by any method of obtaining juice from the cane ; in the eighth place we find that in the mill factory, one acre had a return of 2.22 tons of 1st sugar, whilst the diffusion factory had only 2·11 tons per acre, due to a bad field crop.

This shows plainly that we must know the field crops as well as the work in the buildings. We see from the record that the diffusion estate only reaped 22 tons cane per acre, if it had reaped 28 tons the tons first sugar per acre would have turned out to the amount of 2·69, which is equal to a surplus of 21 per cent. Knowing, therefore, the average number of tons cane which an estate with double crushing reaps from its fields, one has only to multiply this figure with $\frac{9{\cdot}62}{100}$ in order to know how many tons 1st sugar we can expect per acre with diffusion properly carried out. Or, we may multiply the amount of 1st sugar obtained by double crushing with the figure 1·211,

and we shall obtain the amount of 1st sugar which we can expect from one acre if we work up the canes by diffusion. Should a lucky planter answer to this, excuse me, I get 2·57 by double crushing, I can only tell him you must either reap 32·3 tons cane per acre, or your cane has 15·2 per cent sugar, and in either case you would have by diffusion a return of 3.11 tons 1st sugar per acre.

Gentleman, whoever does not move onwards goes backwards! There is no such thing as keeping on the same level. Diffusion is a step forward—a progress—therefore, it is well worth while to get somewhat closer acquainted with it, and to examine under what conditions it can and must be applied to advantage. One thing which I consider very essential if diffusion it to be introduced successfully and lastingly to the sugar buildings of this colony, is a radical change in the training of building officials, as there is no doubt that the diffusion process makes considerably wider claims upon the exactitude of the working people as well as more especially upon the officials. These latter or more exactly the building overseers, must be able to train their working people to most scrupulous cleanliness, to punctual and conscientious work, and keep them to it. This can be done only if the building overseer himself is absolutely familiar with the whole of the building work, if he understands and recognizes the importance of every part of the process of sugar manufacture, as it is carried on in the buildings under his charge, and if he knows the close relations to each other of all stages of the manufacture, from the recovery of the juice up to the centrifugals, as well as the relationship between the steam production and steam consumption. Only a gentleman

possessed of a thorough knowledge of the work which is going on about him can effectually prevent all sorts of stoppages in the grinding, and inferior working of the various machines, which will render his personal services of the utmost value and importance to his employer, and highly satisfactory to himself. He certainly will not have to complain any more about tediousness, and want of interest in his position as so many young building overseers have done to me. A more general proof of this is to be found in the fact that all countries which have adopted diffusion, as France, Germany, Holland, &c., have found it necessary to open schools for young men who wished to become sugar manufacturers; these schools provide them with practical instruction for testing the raw material, and the various products throughout the buildings, for calculating the recovery of sugar, to teach them what is understood by clarification, and what means are at our disposal to effect it, as well as what conditions must be fulfilled to attain the highest possible recovery of 1st Sugar.

The handling of a diffusion battery requires the utmost care. The size of the chips, the filling of each cell with these, the presence of more or less trash, the temperature of the juice heater between the cells, and finally the drawing of juice at the juice measure, are all according to prevailing circumstances of great and manifold importance to each other, making the final aim of obtaining a satisfactory and complete exhaustion of the chips, along with a minimum dilution, a by no means easy and simple matter.

The next thing is that diffusion requires continuous grinding, and in so far puts increased responsibility and

care upon the manager, which makes it all the more urgent that he should be supported by absolutely capable, reliable and conscientious officials, who go about their work with as much intelligent understanding as conscientious zeal.

Considering that with diffusion we obtain an increased yield of 1st Sugar of 20 per cent., the working expenses of this process compared against those of mill work are lessened on all those stages of the estate which remain the same, such as of the growing of the cane, its transport and cutting. The building wages in general become also lessened.

The weightiest change which diffusion brought about, and which almost threatened to preclude the usefulness of the process altogether was, the depreciation of the exhausted chips as fuel, as compared with megasse, which made it necessary to fall back upon coal, which managers of mill factories had been fortunate enough to do away with. Well, in the first place, the chips have once more gained in value after having passed through the mill, if they are used in suitable furnaces. Secondly, in order to recover 21 per cent. more 1st sugar with a dilution of 20 per cent. or less, it will surely pay to burn a few cwt. of coals. In the third place the coal consumption diminishes very considerably with continuous grinding, for with a frequently interrupted grinding the weekly coal consumed remains the same as a rule, whereas the sugar returns diminish greatly, making the coal per ton of 1st sugar, of course rise very fast. We again see here how immensely important it is to have adequately trained building officials, who have a thorough command over their working men, able to

meet any difficulty arising in the grinding with prompt redress.

I may mention here that a hardly less formidable enemy to diffusion had to be overcome by the beet sugar industry in the shape of the fodder question. Before the introduction of diffusion, 1865, the press refuse sufficed in a building of the size of *Nonpareil* to fatten two to three hundred oxen, which previously had done good service in the field and building yard, while the chips represented a poor and unwholesome fodder, which could only be used with the addition of artificial strong food; only a few years ago they succeeded in making the exhausted chips once more a valuable food, long after diffusion had triumphed all over Europe, as it has done since 1875.

Among the different modes of arranging the diffusion cells, the circular one is undoubtedly preferable to the one with single or double rows, as with the former mode a better way of removing the exhausted slices has been found in the turn table invented by Mr. L. JONES. From the turn table the exhausted chips should reach the mill by the shortest way possible, as it is difficult with the wet chips to make any kind of carrier answer.

With regard to the number of cells in the diffusion battery, I consider 14 most suitable, each of them holding about 20 cwt. or one ton, and the diameter being 1 to 3 to the height. Changing the cells as quickly as possible is conducive to the obtaining of a juice with a high quotient of purity and consequently to obtain a purer massecuite which leads to a higher curing. The maximum duration of one hour from the moment a cell is put under pressure until the time it is emptied of the exhausted chips should

not be exceeded. The diameter of the cells should be limited as it would otherwise increase the difficulty of packing tight the bottom plate, and make it bend. To employ air pressure instead of water pressure for the last cells has solely the object of saving water. Wherever there is a sufficiency of water, air pressure should be entirely omitted as it increases the working expenses and retards the process of exhaustion. Without air pressure smaller draughts of juice will be required whilst dilution and exhaustion remain the same. A special arrangement of pipes on the battery which allows of skipping any of the cells increases the safety and the uninterrupted course of the work to such a degree that it is well worth while making it.

The carrying of the cane from the punts to the hoppers or slicing machines is still done in a very slow and expensive way, the cane being unloaded at the platform by manual labour, the canes being put again by hand into hoppers, but various projects for the direct transmission of the cane to the hoppers through mechanical means have been already suggested and are sure to find a satisfactory solution as soon as diffusion is more largely adopted in this colony.

With regard to dilution, the percentage of water used for extracting the juice I mentioned already that it is quite practicable to keep it within the maximum limit of 20 o/o. If the grinding is to proceed regularly and without interruption an adequate evaporating station must be connected with the diffusion battery, as well as with one, or better with two vacuum pans, constructed in proportion to the evaporating station. The choice of an evaporating system depends largely on the price of the

fuel. With cheap fuel a simple system will do, but with expensive fuel a triple or quadruple will pay, quadruple means a saving of steam against triple of 13 o/o and an enlargement of the heating surface of 33 o/o. As it is of immense importance to have throughout the building all the various stations in a perfect proportion to each other in regard to their efficiency it is advisable for a proprietor who wants to go in for diffusion to erect an entirely new building based on his field crop.

The vacuum pan should be placed in such a position as to make it possible that the massecuite without being touched by hand is emptied out, saving in this way a considerable number of hands and besides massecuite. I may at this place take in consideration under what conditions Schützenbach's boxes become superfluous. Massecuite, freshly emptied from the vacuum, undergoes doubtlessly an improvement in its contents of sugar crystals if it is put to rest and to cool in Schützenbach's boxes. We have to distinguish between the quick crystallisation of 1st sugar and the slow one of 2nd and 3rd sugar. The former is promoted by evaporation and completed by short rest. The second is indifferent to evaporation, but is furthered by a rest of several weeks. To obtain therefore a completely crystallised 1st Massecuite there is but one way which is by continuing the evaporation in the vacuum with low temperature to the utmost, with application of the so-called pug mill vacuum pan into which the 1st Massecuite with a water percentage of 6 or 7 is emptied. The vacuum pug-mill is a closed vessel with stirring apparatus and double plated bottom, which makes it possible by means of double heating and vacuum to keep the Massecuite in such a condition that an evenly

accelerated evaporation takes place without the necessity of making it boil. The rising steam bubbles easily work themselves up in consequence of slow mixing to the surface, until the water percentage of 4 is reached. The boiling is consequently finished in the vacuum pug-mill where a coarse and even grain is obtained. By mixing now with molasses this Massecuite is got ready for curing. The vacuum is then shut and by means of air pressure the movable mass is driven to the centrifugals.

Another important item which tends to cheapen sugar-making by means of diffusion is the reduced acreage which has to be taken into cultivation to reach the same amount of 1st sugar. Having ascertained that with diffusion we require on an average 10·39 tons of cane for making one ton of 1st sugar, a yearly estimate for making 4,000 tons of 1st requires 41,560 tons of cane. To obtain the average yield of an acre with normal seasons and normal labour, taken as 28 tons of cane, we should therefore have to take in cultivation 1,494 acres.

Considering the exceptional absence of technical training with the generality of the planters, one cannot help being struck by the fact that even without it and with machinery and working methods which are considered antiquated in almost all other sugar growing countries, Demerara has been able to keep the position which it has held up to now as a sugar producing country. Apart from natural conditions, which are doubtless favourable in this country this is certainly very creditable to the practical common sense and natural intelligence of the Demerara sugar planters; it has enabled them to carry to its utmost perfection all that

could he done with their imperfect contrivances. Practical common sense has however reached its limit in the sugar buildings of Demerara and the results of systematic and professional study, in the shape of modern inventions have to be taken in account if the former position of this Colony in the sugar market is to be kept up.

In conclusion I cannot help regretting, that as yet my arguments are not supported by very brilliant results obtained with diffusion in this Colony. Were I in the lucky position to erect, and to direct a model diffusion building in Demerara I would not stop to argue, but I would invite you one and all to come and look for yourselves. Unfortunately it has been hitherto my fate to play the part of the fault finder without being allowed to become the fault mender.

Gentlemen, the working up of the cane juice is somewhat simpler than that of beet juice, as nature has rendered in most cases cane juice much purer. Add to the improvements made during the last 20 years, diffusion, and with this mighty weapon of progress, intelligence and industry, you will not have to fear the competition of beet sugar. Then, the day when Demerara will have sunk down to a cattle farm, as some nervous souls are prophesying already, will once more sink back into the distant future.

The Negro in the West Indies.

By the Revd. J. G. Pearson.

THE twang of 'Ulysses' Bow' has startled a good many slumberers, and frantic efforts to prove that Mr. FROUDE has missed the mark in the case of the Negro in the West Indies may not be unexpected. Indeed we are beginning to hear of good people shocked and of others giving expression to grave doubts as to the worth of his remarks on the descendants of our former slaves; and yet were the majority of his critics doomed to live a few years in the West Indies, the last thing to occur to them would be to differ from him in his main assertion that the black is relapsing into his natural state.

Negrophiles, and those who accept their opinions, too often suffer kindness to stifle reason, and debar themselves the pleasure of being just because it would seem to be unkind. Nevertheless unkind justice is a greater boon, even for the negro, than unjust kindness. "The negro is a man and a brother" is the text we hear, *ad nauseam*, from every philanthropist's platform, and we believe the preachers are quite earnest because they are so refreshingly irrational. The blacks exported from Africa to till the sugar plantations were barbarians. Nothing but the wildest flight of poetical imagination could represent their Afric homes as peaceful or happy. No well built towns, or national monuments of science, art, or religion, ever excited pride in their race. Direct personal affections alone bound them to the land of

their birth. History and tradition they had none; their folk-lore was rudimentary in the extreme, while patriotism, as we understand the term, the very conditions of their life precluded. Religion, such as they had, lacked almost everything that ennobles its possessor; grovelling fatuity varied with inhuman cruelty were the extremes of its gamut, and only as he rose and lived above it did the African prove himself a man.

Such were the blacks introduced to the West Indies, and from such were developed our slaves.

I do not sympathise with slavery even in its mildest "domestic form" any more than the tenderest hearted abolitionist, and yet I contend that the condition of the average slave in the West Indies was far above that of the average negro at home. Neither do I wish to waste time defending or condoning the "horrid traffic;" I merely desire to point out to the reasoning men and women of England the futility of speaking of, legislating for, and treating the blacks as upon all-fours with ourselves. Privation, suffering and enjoyment are relative terms, and before the woes or joys of a people can be estimated their capacity to suffer or enjoy must be ascertained. One of the frightful blots upon the slavery system, and of which crying horrors were lavished upon English ears in bygone days, was the power masters had of separating husbands from their wives, and children from their parents. Yet if side by side with these heart-rending atrocities could have been placed our experience of connubial fidelity and parental affection in the race, two-thirds of its horrors would have disappeared at once. Had the slave been badly housed—though that charge as far as I remember used not to be brought against the

"inhuman monsters," the slave holders—it would have told with splendid effect, but now the world is before him, and nature pouring her treasure at his feet, the average black is yearly growing more indifferent to the shelter that a substantial roof-tree affords. The simple truth that lies at the bottom of the mistakes made about the negro is in the estimate of his capacities for enjoyment and suffering,—progress and civilization. The question may occur to the reader, however, how is it you talk of a retrograde movement in their ranks, if, in spite of slavery and all its attendant evils, the slave became something or was something from which retrogression was possible? The answer is found where it is least likely to be sought for. The new conditions of life—his being a mere item in the "estate's live-stock" notwithstanding—actually raised him. Contact with the white man, a being of an order as much above him as the classic heroes were above the "vulgar multitude," was an element in his new environment which counterbalanced much of the evil he had to suffer. Slavery brought him into contact with new and to him as yet unknown phases of life, as order, law, safety, labour, and the reflection of, if not the actual exemplification of, a pure religion—a religion which ultimately broke his shackles. All this was to him as the regimen of school to the boy. The crowning lesson he learnt was to labour and be proud of his work. In every negro there is possibly an organ of industry, or whatever equivalent phrenologists locate in the brain for it, though one is sorely tempted to doubt it sometimes; but the artificial position in which we have now placed him relieves him of the necessity of cultivating that virtue. It has been,

and may still be, objected that the slave on the eve of his liberation was a mere machine, and there is much truth in that assertion, but he was such a machine as conduced to the well-being of the state, his neighbours, family, and himself. Now, inasmuch as he has ceased to remain a working machine, he is an element of weakness, if not danger, to the state, of discomfort to his neighbours and the cause of actual misery to his feeble dependents. In precisely the degree he is relieved of the restraints of his former environment, he sinks into apathetic indifference to the claims of manhood and has only to be left alone long enough to reduce him to the condition of his naked, red-rag fetish-worshipping ancestor.

I have studied him carefully for the last four lustres and I deplore my present convictions. It seems as though nature's youngest child in the genus homo can never rise to a worthy state of civilization without some active incentive to progress outside himself. Far be it from me to say that he lacks anything necessary to make good his claim to man and brotherhood: all I say is that these virtues are in a very primary elementary stage; they are in fact only latent, and Nature does not seem to have endowed the son of her old age with the power which can transform potentiality into reality.

No conditions of life could afford a field for a fair trial of the negro's power to raise himself to a higher plane of civilization, or to maintain that to which the slave-driver's lash had urged him, better than the lowlands of Guiana. Here, when he became his own master, the country was before him. For a comparatively nominal sum he could procure land unsurpassed for its prolific yields. The climate was exactly that to which by nature

he was best suited. 'A paternal Government' interfered to protect his rights on the slightest occasion. Within easy reach were sugar plantations where his services as a free labourer were welcomed and repaid at a highly remunerative rate. In fact, on whichever side he looked, an open field was before him; and I confess he gave great promise of justifying the prophesies of his champions. He bought land and laboured upon it: he cared for his live-stock and it increased; he obeyed the teachings of Christian pastors and spent his money liberally upon humane institutions such as schools, churches, etc. His own house, if not a home as we understand the term, was a substantial and decent dwelling place. His friends were jubilant. Victory was shouted on every side and we were heartily glad to have come out of the affair so satisfactorily.

But it was all a mistake. His civilization was a dream; his progress a myth; the Ethiopian had not "changed his skin." The victory credited to the moral elevation of the ex-slave was due to the power of the 'dead hand' of slavery. Fifty years have passed since the news of 'freedom' crossed the Atlantic, and the condition of the black is lower, infinitely lower, to-day than it was then. A half a century affords time to overcome or lose a habit, and the negro has availed himself of it to free himself from the habits of industry and obedience that slavery so bitterly, but beneficently, taught him. In proportion as he has been left to himself he has sunk to his old plane of semi-barbarism. Squalid surroundings, neglected holdings, fallen and falling homesteads, trouble him not. This very morning I had occasion to walk across a once beautiful estate owned by some fifty negro families.

Upon it stands what was once a fine commodious chapel, a minister's house, and a large schoolroom. No fairer piece of God's bright earth could have fallen to the lot of any little batch of peasant proprietors. Four hours labour, per diem, of each able bodied person, would suffice to make this charming estate a flourishing and paying concern. Every family might have a home in which plenty should reign. A high sand reef offers a lovely locality for houses, barns, sheds for cattle, etc. Wide pasture lands stretch out to windward, offering fattening grazing for live-stock; and rich fertile soil lies to leeward, ready to smile abundant harvests twice a year for the minimum of care and attention. Is it possible to imagine conditions of life more tempting to virtue and industry? Yet the state of that place is one of absolute decay and ruin. Houses once strong and substantial have fallen and rotted, as and where they fell. Roads once high and dry are quagmires. The mud and water reached half-way to my knee as I waded through. Drains and dykes once deep are filled and useless. Dams which once kept the sea at bay are broken through, and salt water covers the very fields where their food should be growing. Loitering about could be seen people of all ages. The village is no better than an encampment of squatters. On Sunday morning last I passed through the same village to seaward and though the sea water was lapping the brink of the dam raised to protect their homes, one solitary old man was the only individual who cared sufficiently to turn out and try to save the village. This is not an isolated case nor anything abnormal. From all parts of the West Indies, we hear the same sad tale.

But should we be surprised at it? Are nations made in a day? Can the undercurrent of heredity be cut off by an act of parliament? I trow not; and justice seems to me to demand that we who brought the negro here for our own purposes should drop our *laissez faire* policy and step in now to save him from suicide as a race and from relapsing into the predatory squatter his ancestor was ere we brought him across the Atlantic.

And what, the reader asks, has been the result of your work as teachers of Christianity? Has it failed?

In reply I assume the Hibernian attitude and answer by the counter question, how long did it take to Christianize Great Britain, and were there not many secondary causes facilitating that work and making for an end in the same direction? And I would further ask, what percentage of white men are even now anything more than nominal Christians?

All Africans in these parts are ostensibly Christians, many really so, and but for the restraining influence the partially understood and accepted tenets of "our faith" have exerted, the negro would have reached his retrograde goal long since. Christianity has not proved a failure here any more than among our own English, Scotch and Irish peasantry, who after centuries of its possession are still in some localities steeped to the lips in superstition. In every case where its truths have been honestly accepted and acted upon, it has done just the same for the African as for the European or New Zealander. As to its indirect influence upon the masses, we are bold to claim for it a power which has prevented the low moral tone which obtains from sinking to still greater depths, and supplied those unwritten codes which find their

equivalent among the 'classes' under the appellation "good form."

Christianity can do all the negro needs, if he will accept it and be guided by it, but there exists no authority for forcing it upon him by fire and sword. Its very nature is opposed to force of any sort beyond that of persuasion. It forbids any unlawful sanction behind it such as that upon which other systems have relied for success. But, with civilization, citizenship, and all the duties and benefits the individual secures who dwells in a community other than barbarous, it is different. Willing or unwilling the unit must be kept up to a certain level. It is necessary not only, or so much, for his own sake, but for the sake of others among whom he dwells; and it is because I see the Black sinking below this level and becoming a scourge to his own and other people that I claim on his behalf, not indeed a resurrection of the 'dead hand' of slavery, but such a modification of its wholesome methods as will secure for the ex-slave's descendents such a measure of justice as will secure his babe from the present risk of passive infanticide, and the aged from a lingering and painful descent to an unmourned dissolution.

In the Bush with a Camera.

By the Editor.

NOWHERE in the world perhaps is the forest scenery more beautiful than in British Guiana. Along the banks of the creeks, where the sun can find an opening, vegetation is so rampant and diverse, that every bend opens up a new picture. How few even of the inhabitants of the colony have had opportunities of observing these, and even when such occur, how many are prevented by the discomforts of a journey in a small craft in which they are cramped for room and exposed perhaps to drenching rains. To us however the very odour of the forest brings up memories of some of the pleasantest hours of our life. True, we have suffered from a great many inconveniences, but after all what were they? Rain, ants, jiggers, and sand-flies constituted the most important and they were nothing to grumble at. As for centipedes and scorpions, jaguars and poisonous snakes, these are rare or difficult to find and only frighten the ignorant. We have often thought it a pity that some of these beautiful pictures cannot be perpetuated by the Camera. When we look at most of the book illustrations of tropical scenery, we see that they have simply been evolved from the imagination of the artist. Why not take some photographs, and have them reproduced in place of these? Why indeed! We are unfortunately hardly worthy of the name of amateur photographers, and although we have some idea of the laws of optics and the theory of the

process, we hardly conceived that there could be many real difficulties. With the advent of dry plates, we thought these had all disappeared. All one had to do was to put in a plate, fix up the Camera, and, hey presto! it was done. This was our opinion up to a few months ago, when we made a trip to the bush to bring back some of the scenes which we had in mind and which had been impressed upon us for a long time as desirable to perpetuate. Our memory of a certain creek on the Demerara river, where first we were ushered into the mysteries of forest life some twenty-three years ago, made this the goal of our journey. Accordingly, one afternoon found us in a small bateau pulling against the dark stream, which wound in and out, disclosing and again shutting off one picture after another. We had our Camera with six plates in its slides, and were, as we thought, ready. That was all very well. Here was a scene ; a beautiful clump of Manicole palms as a central object and a confused jumble of great trees, bush ropes and tree-ferns, at either side and behind. "Let us take that," we said, but our assistant looking round enquired laconically "where from?" "Oh! we said," anywhere; from the bateau if we can't get a stand on either bank. He looked at us and smiled; he was accustomed to focus people in his gallery, where the Camera could be fixed up anywhere, without difficulty. Here we were in the midst of a strong current, the boatmen holding on to a bush-rope to prevent our craft from floating down stream while we were considering the situation. We looked first to this side and then to that. The creek had banks of course, but they were hidden by a jungle of creepers great arums and marantas, which would take an hour to

clear away. "Here is the best place for the Camera," said my companion, pointing to a particularly inaccessible jungle. "What do you say PRINCE; could you clear that space with the cutlass?"

Looking down at his bare feet and then shaking his head, the negro replied, "No boss! too much pimpler (thorns)." "Well then," said I, "we must try it from the bateau."

This was easier said than done. The hard curved sides gave no hold to the legs of the instrument and it was almost impossible to get it to stand. Then the frail craft was rocking in the current, and with the movements of the photographer, so that when one leg was fixed the others slipped down. Once, the Camera was nearly overboard; then its lens cap fell into the water and floated down stream where we had to follow and pick it up. We were however soon back again, with two men holding the bush-ropes, and making another trial.

"It's no use," said my companion, "we shall never obtain a good picture. I can't get the Camera to remain steady, and as for focussing, it is impossible."

"Well," said I, "expose it any way, we have lots of plates," and he did so with the result as we afterward found that it was almost worthless.

On we go again, our ardour somewhat damped by the difficulties of this first plate. Scene after scene passed before us and was left behind on account of similar difficulties. Now we came upon an opening on the bank made by some woodcutters, and although the scene in front of this was not up to our expectations we resolved to take it. Before us was a tree with its roots over-

hanging the water, on which grew a number of orchids, including Stanhopea eburnea. Even here however the cutlass had to be freely used and in the end the picture was disfigured by a leaning trunk in the foreground quite out of focus. We had our doubts of these pictures as may be supposed, and, rather disappointed, resolved to delay no longer but push on to our camping ground.

By the time we reached it sunset was near, and as the erection of the tent and hanging of the hammocks took a little time, the Camera was set aside until morning.

Our camp was in a little clearing on a sand-reef, a place probably occupied centuries ago as an Indian village. We remembered it years before as the site of a benab occupied by a boviander, who had an Indian wife ; now it was quite deserted. The old shed was hardly weather-proof, but we put our canvas over it and although not without misgivings of jiggers (confirmed afterwards by finding two of these troublesome pests in our toes), we settled down for the night after a good meal and cup of coffee.

We are always restless the first night in a strange bed, and more so in a hammock in the midst of the forest. The surroundings are so strange and the difference between the flexibility of the net as compared with a hard hair mattress all tend to prevent sleep. Fortunately we had candles and one of them fastened to a stick thrust into the sand enabled us to read until our usual bedtime.

How long this first night seemed ! In town we can move about in the evening and we hardly feel that night has properly come until about eleven or twelve o'clock, when the streets become deserted. Here in the forest

however, night falls at sunset and it will be twelve hours before the day again appears. Meanwhile, we cannot move from the immediate surroundings of our camp, for although the danger of wild animals is of little or no importance, the difficulty of walking even where there is a path amounts to a virtual impossibility. Even in the day forest travelling is difficult and it is needless to say that at night it is not even attempted.

Neither of the party having a watch we could not count the hours, but they were none the shorter for that. As we lay trying to sleep and only succeeding in musing over a thousand fancies, it seemed as if it would never be morning. By and bye our camp-fire sunk down, and as we could not sleep, we got up and replenished it. Then PRINCE got up and stretched his limbs and we asked him whether it was nearly morning. He looked up at the star-lit sky and said no, he thought it about three o'clock. We however fancied there was a little glow in the east and prepared coffee so as to be ready at sunrise. We discussed our coffee but it still got no lighter. The frogs continued their weird calls, but the birds, the harbingers of dawn, remained silent. We lay down again in our hammock, took up our book and went on reading, every now and again going outside and looking towards the east. Now, a chilly feeling crept over us and we were glad to stand in front of the fire. The dew was falling heavily and the dampness produced almost the effect of cold.

However, morning was bound to come at last, and was indicated by the awakening of the birds and the gradual blotting out of the stars.

Now our photographic work was resumed. Through

an old Indian path that may have been in existence for centuries, as it connects the head waters of two creeks, we passed to the sand reef, where a walk at this time was cool and pleasant. Later, the glare would be terrific—the white sand hot to the feet—but now we could wander for miles without any other inconvenience than the fear of being lost in such a maze. However we exposed two plates, and in returning through the forest used the remainder.

Now came a most difficult operation :—without the convenience of a dark room to change those which had been exposed for others. We had provided ourselves with a black bag into which a ruby glass window was inserted, and within this hot and stuffy receptacle our photographer had to creep. Although the work only took up a minute or two he came out flushed and in a bath of perspiration. However, it was done and we were ready for further operations. Leaving our impedimenta in camp we proceeded up the creek, intending to get a view of the open savannah with its fringe of eta palms, but here the difficulty of focussing was too great for success. There was nowhere except on the curved sides of the bateau for the legs of the Camera; if they had been put overboard they would simply have sunk down into the mud and water. Then the sedges were very tall and too much in the foreground, so that although the picture was taken it turned out very poor. Somewhat disappointed, we again went back to the jungle and made several attempts to get standing room for creek scenes. This portion of the forest was inundated—the buttressed trees rising from irregular pools and mazes of winding channels, choked by a dense thicket of prickly palms, saplings, creepers

and magnificent herbaceous plants. Here was indeed a jungle of a most interesting kind and we began to look for standing room. One beautiful scene after another had to be abandoned on account of the utter impossibility of fixing up the Camera and we almost despaired of getting a picture. However, after a great deal of trouble we found the bole of a tree sufficiently large for our purpose, and after free use of the cutlass and getting sundry pricks from the spiny palm stems, at last succeeded. The view was however by no means perfect, bush ropes and leaning trunks coming in the way, but it might be considered as middling rather than bad. Back again to our camp and a hearty breakfast, after which we tried to take a picture of the clearing. It was a very interesting place. Several cocorite palms decorated the borders, behind which came second growth forest. Looking round, the red man's footprints were visible in the plants growing up from the otherwise bare sand. First came the pine-apple in great clumps everywhere, diversified by one or two thickets of krattee, the fibre plant so useful to the Indian. Then came the beenas, the charms to bring success in hunting, the most plentiful being the Belladonna lily (Hippeastrum equestre) which gave the effect of a wild garden to the whole clearing. Looking farther, a few Caladiums rewarded our search, together with toya (Dianthera pectoralis) and some other plants grown as beenas or for medicinal purposes. We tried to get a good view with some lilies in the foreground, but it turned out very badly, possibly on account of a few drops of rain falling just at the critical moment.

After the shower was over we walked down to the creek and took a picture of the path leading up the hill,

which turned out very good. Near the landing we gathered a little collection of filmy ferns (Trichomanes) on the chance of bringing them back alive, in which we were fortunate enough to succeed.

Having now exposed the second half dozen dry plates our photographer had again to enter the bag and change them, after which we packed up our traps and proceeded down the creek. Scene after scene was passed without the remotest chance of procuring a picture except with unlimited time and free use of the cutlass, and we had to pass on. It was with pain and regret that we did so as the results of our work hitherto were, to say the least, doubtful. By and bye we came to a wood-cutter's place standing on a sand-hill, up which we climbed to see what could be done from its summit. Below stretched the creek bordered by dense forest, the tree-tops nearly a hundred feet above the ground. Towering above, as high again, came a giant mora, which after great difficulty we succeeded in focussing, not however to our satisfaction on account of a hut and clusters of bushes in the foreground. Another clump of great timber trees also turned out quite as unsatisfactory.

Near the mouth of the creek stood a great silk-cotton tree covered with epiphytes—a land-mark to everyone going up or down the river. Fortunately for us this was fronted by a clearing and we found no difficulty in getting a picture, after which we proceeded back to Georgetown.

Of course we did not know what would be the result of our two days' work—this could only be learnt when the plates were developed. However, we hoped for the best and consoled ourselves by the fact that we had

made several new mental pictures of forest life and collected a number of orchids and ferns. While up the creek we had gathered a very fine plant of Coryanthes speciosa, and the amouut of discomfort that plant gave us can scarcely be conceived. It is hardly necessary to mention that this is one of the plants protected by carnivorous ants, for which its roots provide shelter. After chopping it down and removing the cluster of twigs which formed a bush round it the whole was plunged into the creek below our bateau and pushed under with a paddle. By this soaking myriads of the insects were dislodged, but as we found later by no means all. At last however it was taken in and put down near the bowman. Our craft was small and what might be generally considered "cranky," so when presently Mr. Bowman began to squirm and shake himself we called out rather peevishly, "What is the matter now?" It did not take long to explain as the little pests could be seen crawling over his neck and face. Then our other companions began to scratch and pinch their clothes as the ants gave them now a nip here and another there until all were more or less uncomfortable. They had a nasty way of getting into the hair and beard which we found particularly aggravating, and what made the matter so much worse was the fact that we hardly dared to move for fear of upsetting our bateau. Then our craft was loaded with a heap of plants which stood in the way of stretching out our legs and kept us continually in fear that the boatmen would crush some of them. However, we got back to town at last, very tired and quite ready to appreciate home comforts, which were all the more agreeable for even such a short deprivation.

The Coryanthes which gave us so much trouble has flowered since and we hope will remain as a souvenir of this particular trip for many years to come. We cannot often go to the bush and must be contented with a few specimens in our garden, but even here they bring to mind the surroundings from which they were taken.

*Our Provision Supply.**

By W. T. Binnie.

THE supply of food, affecting as it does every branch of industry in all colonies and countries, forms an imposing subject, and perhaps this paper would have been more effective every way if it had proceeded from the pen of a modern agriculturist. As however the markets in Georgetown, where are sold the overplus provisions and fruit produced in the Colony after the estates employès and farmers' wants are supplied, may be considered a constant gauge, by quantity and price, of the extent of provision cultivation in the Colony, the Clerk of the Markets has the honour of preparing and reading before this Society, a paper on "Our provision supply." There is no necessity to rehearse first principles as bearing on a cheap and plentiful supply of food and a profitable employment of capital in the production of staple exports, yet I must emphasize the term overplus provisions, supplied to our city markets, because with the exception of the bank of the river Pomeroon, the rivers of the North West District, the Camoonie Creek, and the Demerara River, farming is simply a mode of procuring subsistence and not a trade, and until provision cultivators as a whole make a trade or business of farming, native-grown food-supplies must not only fluctuate between extremes, but in general be both scarce and high priced. Provision cultivation on the empoldered land may be described as four years'

* Read at the October Meeting of the Society.

cultivation, to be cropped and fallowed in bush or grass for six or more years, while on the forest land bordering the numerous rivers and creeks of the Colony, all the advantages of the system in vogue with the Hill tribes of India and Burmah are secured and the option of fallowing or moving to new lands can be practised. Sir WM. HUNTER says: "The system yields a larger return for "the same amount of labour than permanent plough "husbandry. A virgin soil, manured many inches deep "with ashes and watered by the full burst of tropical "rainfall, returns forty to fifty fold of rice, which is the "staple grain thus raised." Here we have the return of rice from land so situated that it is impossible to flood the rice fields, and if our farmers on the Pomeroon and in the North West District would take the hint, they might add largely to their profits, but upland rice would require to be planted or rather sown. The different kinds of rice vary, some having straw 12 feet long which keeps the head of grain above the rising waters of the Bramapootra River, others have straw 18 inches long, grown on the arid plains and dry uplands of Orissa. In Nepal "various "dry rices are cultivated, and some do not require to be "flooded as in Bengal, but flourish in the driest and "loftiest spots." Such is the wide extent of soil and climate to which rice may be profitably cultivated. Would that some individual or the Colony's landlord, would experiment for the benefit of all, and thereby make rice a staple production. Returns from provisions generally are in a like case. Notwithstanding all this abandon of tropical nature, playing upon a virgin soil, which I cannot think is one grain of yielding power behind that of the East Indies, the price of provisions

rules high and stocks are largely supplemented from Barbados. The following gives in detail the prices and quantities of growing provisions brought to the principal market :—

TABLE OF AVERAGE DAILY RECEIPTS AND DELIVERIES OF PROVISIONS AT STABROEK MARKET DURING NINE MONTHS, ENDING 30th SEPT. 1894.

	Prices From	To.	Lbs. per bunch or pkg.	Number.	Net weight in lbs. or average daily weight,	
Plantains—						
Bunches	$0·24	76	30	489	14,670	64½ p c. of flesh matter, = 35½ skin.
Com. Yams, brls.	2.16	3.24	127	10	1,270	
Buck Yams „	3.00	4.80				
Sweet Potatoes—						
Brls. and bags	1.68	3.00	168	91	15,288	
Chinese Eddoes „	60	2.00	147	52½	7,717	
Tanias „	1.20	3.36	154	14	2,156	
Sweet Cassava—						
baskets,	64	72	65	24	1,625 lbs.	= 28,256 roots
Corn, brls.	2.40	4.00			5,232	used for poultry, &c.
Bitter Cassava—						
bags,			155	14	1,876	used for starch making.

This is from one-half to three-fourths less than the necessary supply for Georgetown.

The sources of provision supply vary; while the East Coast of Demerara during 1892 forwarded about 40 bags of sweet potatoes and from 200 to 600 bunches plantains weekly, during the nine months of 1894 the supplies have become almost nil. The districts of Mahaicony and Abary have however forwarded 600 to 800 bags of sweet potatoes per schooner during 1894 up to date.

There has also been an improvement in the quantity of plantains and roots sent forward from the Banks of the Demerara River within reach of the City market.

The Chinese of Camoonie Creek continue to send large quantities of eddoes, sometimes 300 bags, and 40 to 50 barrels of yams in a week. The South East bank of the Essequebo appears to be owned or tenanted by an energetic class of Creoles and East Indians, who nearly monopolize the market on Monday in each week, with large quantities of bitter cassava and Chinese eddoes. A new source of supply has been tapped during the past few months; plantains, corn and roots, are bought in New Amsterdam market and transported by schooners and steamer to be sold in Stabroek Market, thereby making Georgetown the centre market for the Colony. The farmers on the banks of the Pomeroon river, and in the North West District employ about twenty small schooners transporting plantains, corn, roots and other provisions to the Georgetown markets, and shop and house supplies on the return voyage, and the steamer brings increasing quantities from the Barima river and tributary creeks.

Having mentioned the chief sources of the vegetables supplied to our City market, I may now recur to the necessity of an increase of one-half to three-fourths in the quantity of provisions furnished, to meet the want of the over 50,000 inhabitants of Georgetown, who have only 15 ounces of plantain, flesh matter, and 44 ounces of roots per day, for every family of five individuals, if no additional supplies are taken into account. Since the above calculations were made, I have obtained a note of the

actual food used by a man, his wife and three children as under :—

¾ lb. Plantains	... 2c.	2c.
2½ „ Roots eddoes, yam, potatoes or Bread 4c.	... 6c.	6
1 „ Flour, serve 4 days ...	... 3c.	1
1 „ Sugar, „ 2 „ ...	... 4c.	2
Pork	... 2c.	2
Fish	... 2c.	2
	—	—
2 x 3=5 persons	... 19c.	15c. per day.
	—	
	9½d.	
	—	
Sunday ½ lb. Butcher's meat	... 6c.	
	—	
	21c. per Sunday	

Perhaps our medical men will know whether with the potatoes (Solanum tuberosum) imported, the people have enough vegetable food furnished for their maintenance in health.

We have only dealt with the quantities of provisions which pass through Stabroek Market, but if we go beyond the wants of the city and note the universal lament of dull trade, and that sugar estates do not pay, we find the supply of provisions not only requires to be increased three-fourths, but from three to four times or more, even enough to enable the day labourer to live upon a lower rate of wages without having to reduce his amount of food, but rather to enable him to increase it. How is this to be accomplished ? Provision farming must pay as well as store keeping, sugar, coffee and cocoa planting, and although with only manual labour available, there is little facility for labour saving methods of cultivation being adopted, yet there are a few loopholes through which light may be thrown upon the

possible. One of these is that although with the virgin soil we possess to so great an extent, any fall in price of provisions would infringe on the large margin of profits which is the reward of the intelligent cultivator, it would be useful in quickening his foresight. He now thinks of bringing down six trees by cutting one when clearing land, and of empoldering his farm in sections, so as to confine injury or loss to one section if the back dam breaks and bush water comes upon his farm, then he would look to increase his crops by change of seed. That grown on sandy or clay soil would then be used to plant pegass soil, in a word, he would calculate how to conquer nature by applying nature. The landlord of our great virgin soil districts—the Government Executive—might lend a helping hand by allotting land in portions of five acres and upwards on a lease for seven or fifteen years, at a rent fixed according to quality of the soil at the time the land is surveyed. Then at the end of the term of lease the rent might be revised and adjusted. This would enable poor industrious men to open land, feed and educate their family, and save enough to enlarge their farm when the lease expired. I can look back to a parish I know well nine miles long and six broad, in the south of Scotland, which by similar means was converted in 20 to 30 years to return a rental of over £8,000 per annum, and to become a populous and fertile country from being a heathy waste; this scheme was begun about 100 years ago. Some one says "The people." People are people all the world over, it only requires the head to make use of them. In practice it is a great mistake to oblige a poor man to purchase land, and then keep him poor by the necessary duties attached

to land owners however small. Let the land be peopled with farmers on separate allotments, not by villagers. There are two points gained. By this less capital is sunk, more kept floating, and more produce is furnished for the market—by the farmer living on his land. A villager is subject to the disadvantages of living two or three miles (some even ten miles) away from his cultivation—either neglecting his family in the village, or his crops on his provision land. In certain conditions of the soil rain falls, and before he arrives in his field the benefit and opportunity is gone; corn is ready to gather, but before he gets there the rain is down. Again the Government landlord might assist by subsidizing a steam barge system for the speedy transport of produce. The foregoing is an indirect yet a permanent mode of giving prosperity toward the profitable working of our various industries. I must leave the great benefits and advantages of rotating sugar cane with provisions on sugar estate lands to the experienced young planter, only calling attention to the success of the system of converting labourers into tenant cultivators and assisting them by the steam plough, adopted by the controllers of the Daira Sanieh in Egypt, which converted estates suffering from large losses, in five years into a source of great profit (see *Daily Chronicle* 28th September, 1892), a system, I consider, capable of adoption on large estates in this Colony of British Guiana. The following is the extract: —

SUGAR CULTIVATION IN EGYPT.

An interesting note by Mr. Hamilton Lang, C.M.G., controller of the Daira Sanieh, upon the results of the year 1891 shows how under skilful management, this administration, which during the previous five years had been a drain upon the Egyptian treasury to an extent varying from £75,000 to £265,000 annually, has been transformed into a source

of revenue. In 1891 it yielded £38,000 profit, after paying 4 per cent. interest on the Daira debt of seven and one quarter millions sterling.

The three controllers, a native, an Englishman and a Frenchman, have the management of 475,000 acres of land, of which 150,000 are waste. Sugar cane alternated with cereals, is grown over about 180,000 acres, situated in Upper Egypt, of which over 30,000 acres are always under sugar, which is crushed in the mills of the Daira and constitutes the chief source of revenue. Another tract of 140,000 acres situated north of the sugar district and in Lower Egypt, produces the usual cereal crops and yielded a net profit varying from 3s. 6d. to 11s., and averaging 5s. 8d. per acre. The system adopted by the controllers, which is the only right one for properties of such magnitude, is to lease the lands to cultivators rather than cultivate them directly, and last year they leased 309,000 acres and cultivated direct or on joint account with tenants, only 14,000 acres.

The controllers fix a uniform price at which their tenants are bound to deliver to the factories all the canes grown on the sugar estates, and this price enables the tenants to support their families and to pay a rent to the Daira, which then makes a profit on the manufacture of the sugar. The Daira gives all necessary assistance to its tenants by supplying ploughing, seed, irrigation, etc, and, though its leases contain all the usual stringent clauses, it invariably exercises great forbearance toward all deserving tenants—a principle found to be advantageous to both. Improvements to the machinery and in the processes of the manufacture and also close supervision over the cultivation and all details are among the methods by which the administration has attained an unanticipated success.

Their total production of sugar in 1891 was 58,728 tons. Very much more could be grown, but the existing machinery could not work more during the twenty-four to forty-eight hours between the cutting of the cane and its crushing, a period, which cannot be exceeded without causing deterioration. Mr. LANG forecasts an increase of surplus to £66,000 for 1892. The example of the Daira Sanieh has induced a private company, with a capital of £120,000, to start sugar growing and manufacture upon 7,000 acres, and they expect to put their crop on the market next January. Upper Egypt is very well adapted for sugar cultivation on a large scale, it is a more remunerative crop than cereals, but the large outlay necessary for the machinery puts it out of the

power of the natives, and Europeans are afraid of sinking capital in Egypt while its political future is so uncertain.

In this colony the sugar estates' authorities after careful selection, from among the East Indian immigrants and creole labourers, of the most suitable families, might perhaps bring about a similar result. They might locate them on land to cultivate in provisions, for a term of years. At the end of the term, the land might revert to the estate, to be planted by the owner in sugar canes, as practised on Pln. *Houston*, or the tenant might continue his occupancy and plant sugar cane to be purchased by the owner or owners. Here comes in the old Scotch-law system, of thierlage, by which tenants were bound to bring all grain to a certain mill, and English Radicals may from this learn the necessity and value of feudal usages. By this system, improved methods of cultivation would be taught to the tenants by the estate's staff, especially if assisted by the steam plough, and seeds and plants suitable to the soil could be procured; by which means a greater quantity of grain and pulse might be produced and thereby save the colony money paid to the United States for such necessaries.

No person knowing how Village proprietors in British Guiana perpetuate in their methods of provision cultivation and daily life, the institutions taught their forefathers during the regime of slavery, can be surprised at the value of forty years desert wandering to the Israelites. Habits contracted in Egypt were forgotten and eliminated and a clear course was opened for new habits more suitable to the new conditions. The only path out of this beaten track, is tenant occupation. To conclude, the owners of sugar estates in this colony at the present

time are in a condition very similar to that of the land-owners and farmers of Great Britain. About the years 1845–6 the general adoption of rotation of crops rescued the farming industry from ruin, brought about by the necessary abolition of the corn laws. The island of Barbados also benefited by adopting the same system. When rotation of crops is mentioned in British Guiana the stiff clay soils are put forward as an obstacle; this imaginary difficulty may be overcome by the application of lime and suitable tillage. JETHRO TULL'S system is played out—and steam ploughing is not understood—there being a great deal too much expected from the implement. Time may evolve a new regime; I hope it will.

The Guiana Orchids.

By the Editor.

5.—DIVISIONS OF THE ORDER.

ORCHIDS may be popularly divided into two great classes, first, the terrestrial division which is distributed all over the world, and second, the epiphytes, including those growing on rocks or sand, only found in the tropics. In Guiana we have representatives of both classes, the well-known English butterfly orchis being represented here by several species of Habenaria. The showiest of the terrestrial species however are found in the genus Pogonia (Cleistes) which grow in swamps where the soil is barren pipe-clay or sand. This class contains but few species native to Guiana and is therefore hardly recognised, in fact with the exception of a green and inconspicuous Habenaria, common at certain seasons in one or two old trenches in Georgetown, none are found within the cultivated area.

The epiphytes however are far more numerous, as might be expected from the great extent of the forest region. As certain animals, whose congeners in other countries live on the ground, have here taken to an arboreal life, so many plants in Guiana mount the trees and obtain a share of the sunlight by the help of others. The stages in their progress are still recognisable in several genera, and are beautifully exemplified in the genus Catasetum. The oldest form is probably Catasetum discolor, common all over the sand-reefs and very plentiful about old charcoal pits, easily known by its pale yellow-green,

hood-like flowers and plump pseudo-bulbs. Catasetum macrocarpum (tridentatum) has made a leap upwards and lodged itself in the lower branches of trees, often just above the surface of the creek or swamp, while Catasetum longifolium has got to the top of the eta palm and settled under its crown. In habit these three species are very similar, the pseudo-bulbs being in each case retained, the differences mainly consisting in the flowers. In Oncidium however we have no species now living on the sand, but we can easily conceive that it commenced with a plant something like a Cyrtopodium, which genus contains the largest sand orchids in Guiana. The first step now visible is exemplified by Oncidium altissimum, a plant with large pseudo-bulbs and rather thin leaves, and culminates in Oncidium Lanceanum, the species so well known in Georgetown. Because the latter climbed highest and got into the sunlight, it became able to bear the drying winds of our city streets and illustrate the survival of the fittest from several points of view.

All the species which climbed from the sand have their pseudo-bulbs immediately above the tangle of roots, and their flowers issuing from beneath these or at least below the apex. There is another division of epiphytes, however which rose from the rocks, on hill and mountain, and these have developed on different lines. When growing from crevices it is easy to understand that a soft juicy bulb like that of a Catasetum would be liable to injury, and that a clump of roots could hardly find room to spread. Something had to be done to overcome these disabilities, and it was most beautifully accomplished. When we look at a Cattleya the whole contrivance is plain. The pseudo-bulb has been mounted on

a hard stalk, the flowers are produced at the apex, and the aërial roots extend in every direction without matting together.

In these two great divisions we have the germ of a natural classification which nearly corresponds with the tribes Epidendreæ and Vandeæ, the first having usually terminal and the second lateral inflorescence. Botanists separate these and the other tribes to be presently mentioned, by certain characters connected with the anthers and pollen masses, but as these are not conspicuous or easily recognisable by any one but the student we have looked round for something less difficult. To recapitulate therefore, before going farther, the Epidendreæ were originally rock plants and have terminal flowers and generally stalked pseudo-bulbs or fleshy stems, while the Vandeæ were sand-orchids and have flowers coming from below the bulbs, or where these are absent, from among the leaves at their base. There are a few exceptions, but not enough to invalidate the rule.

The third tribe, Neottieæ, is not so easily recognised as the two first, in fact it is rather anomalous, containing such genera as Vanilla and Sobralia as well as others more strictly terrestrial. The fourth and fifth tribes, Ophrydeæ and Cypripedeæ, are wholly terrestrial, being represented in Guiana by only one genus each.

The following list of the genera found in Guiana will show how they are arranged in tribes:—

Tribe 1.—Epidendreæ (epiphytal; growing on rocks or trees.)

Pleurothallis, Stelis, Masdevallia, Octomeria, Liparis, Bulbophyllum, Elleanthus, Bletia, Diothonea, Scaphyglottis, Diacrium, Isochilus, Epidendrum, Cattleya, Lælia, Brassavola, Schomburgkia.

Tribe 2.—Vandeæ (epiphytal; growing on sand or trees.)

Galeandra, Polystachya, Cyrtopodium, Zygopetalum, Aganisia, Aca-

callis, Batemannia, Bifrenaria, Lycaste, Gongora, Coryanthes, Stanhopea, Peristeria, Catasetum, Cychnoches, Polycycnis, Stenia, Scuticaria, Maxillaria, Camaridium, Dichæa, Ornithidium, Eriopsis, Trichocentrum, Rodriguezia, Aspasia, Odontoglossum, Oncidium, Brassia, Trizeuxis, Trigonidium, Ionopsis, Ornithocephalus, Quekettia, Lockhartia, Angræcum, Macradenia, Notylia.

Tribe 3.—Neottieæ (mostly terrestrial).

Vanilla, Sobralia, Epistephium, Wullschægelia, Stenoptera, Neottia, Spiranthes, Pelexia, Pogonia.

Tribe 4.—Ophrydeæ (terrestrial.)

Habenaria.

Tribe 5.—Cypripedieæ (terrestrial.)

Selenipedium.

6.—THE GENERA AND SPECIES.

Tribe 1.—Epidendreæ.

1. Pleurothallis.—A large genus of inconspicuous plants very common along the banks of the rivers and creeks, growing generally on the smaller branches and even twigs of low trees in the form of cushions or rosettes. They may be recognised by their single leaf, mounted on a short stalk, from the top of which and the base of the leaf, proceed one or more flower spikes. Some of them are very pretty when grown in masses but individually they are hardly showy enough for the orchid fancier. They are however useful to cover the surface of the baskets in which such plants as Cattleyas are grown. Twenty-one species have been recorded :—

1. P. ciliata ... Flowers brownish yellow, downy.
2. P. ruscifolia ... Flowers green.
3. P. pruinosa ... Flowers yellow.
4. P. Lanceana ... Flowers yellow and crimson.
5. P. picta ... Flowers yellow with red stripes.
6. P. sicaria ... Flowers greenish with purple stripes.
7. P. aristata ... Flowers purple veined.
8. P. Grobya ... Flowers yellow and purple.
9. P. emarginata ... Flowers green and white with a rosy lip.

10. P. orbicularis ... Flowers purple.
11. P. multicaulis
12. P. succosa
13. P. crassifolia ... Flowers yellowish green.
14. P. sertularioides ... Flowers whitish, with yellow tips.
15. P. stenopetala ... Flowers brownish yellow.
16. P. rhombipetala
17. P. Miqueliana ... Flowers dark purple,
18. P. Surinamensis ... Flowers yellow.
19. P. acuminata ... Flowers dull yellow.
20. P. biflora ... Flowers purple.
21. P. brevipes ... Flowers brownish purple.

2. Stelis.—This genus is similar in habit to the preceding, but the plants are somewhat larger, and whereas the floral divisions in Pleurothallis are generally pointed and more or less connivant, in this they are rounded and the whole flower almost flat. They are exceedingly pretty little plants and S. grandiflora is a lovely gem. Eight species :—

1. S. ophioglossoides ... Flowers greenish, tinged with purple.
2. S. argentata ... Flowers green and purple.
3. S. grandiflora ... Flowers white and red.
4. S. zonata ... Flowers yellow, zoned with mauve.
5. S. Heylidyana ... Flowers greenish purple.
6. S. ovalifolia ... Flowers dull yellow.
7. S. flavida ... Flowers dull yellow.
8. S. tristyla ... Flowers green.

3. Masdevallia.—A genus containing some very beautiful plants and also others little more showy than some species of Pleurothallis, which they much resemble in habit as well as in the shape of the flowers, these being however larger, fewer on a stalk and the divisions often tapering to long points. Three species :—

1. M. Guyannensis
2. M. brevis ... Flowers yellowish brown with purple spots
3. M. picturata

4. Octomeria.—This genus is also similar in habit to Pleurothallis but the flowers are stemless, clustered, and even less conspicuous. Two species :—

1. O. tridentata ... Flowers yellow.
2. O. Surinamensis ... Flowers yellow.

5. Liparis.—With this genus we come to a different type, with pseudo-bulbs. Only one species has been recorded from Guiana, a small plant with broad, thin, ribbed leaves suffused with crimson, and flowers in a loose spike :—

1. L. elliptica ... Flowers reddish brown.

6. Bulbophyllum.—The Guiana species are small plants, more curious than beautiful. The flower-spikes are lateral and therefore the genus is an exception to the rule laid down for the tribe. The species have small pseudo-bulbs with one or two thick leaves on the top. The commonest, B. bracteolatum, is called rat's tail in the colony from the shape and size of the flower-spike. the resemblance being increased by the little flowers being inserted as it were into small pits all along the surface. Four species :—

1. B. bracteolatum ... Flower-spike thick, fleshy.
2. B. setigerum ... Flower-spike thin, drooping.
3. B. quadrisetum ... Flower-spike thin, almost upright.
4. B. Geraense

7. Elleanthus.—Inconspicuous plants with leafy stems and flowers in terminal spikes supported by large bracts. Two species :—

1. E. furfuraceus ... Flowers bright red.
2. E. Caravata ... Flowers yellow.

8. Bletia.—Handsome plants growing in sand, with roundish tubers depressed to the level of the ground, from which rise long thin ribbed leaves, and, from the

sides, flower spikes or racemes two feet or more high. The only Guiana species is a pretty plant having white flowers with a touch of yellow on the lip :—

1. Bletia florida

9. Diothonea.—One inconspicuous species has been recorded from Guiana, a plant with leafy stems, narrow leaves and flowers in a cluster at the top :—

1. D. imbricata

10. Scaphyglottis.—A genus of small plants having fleshy internodes, with leaves and flowers from the joints; leaves either narrow or half-cylindrical. Six species :—

1. S. violacea .. Flowers pinkish-violet.
2. S. reflexa ... Flowers yellow.
3. S. pallidiflora ... Flowers white.
4. S. stellata ... Flowers purple.
5. S. rosea ... Flowers rose.
6. S. fasciculata

11. Diacrium.—A single species, separated from Epidendrum, with long tapering hollow pseudo-bulbs, from the top of which spring two or three thick leaves, and a raceme of white flowers with a touch of violet on the lip. A very desirable plant but rather difficult to establish, possibly from want of ant protection when under cultivation. The plants should be collected on the original logs and not be too much shaded.

1. D bicornutum

12. Isochilus.—Very inconspicuous plants with one or more leaves on the top of the stem; resembling Scaphyglottis, but the flowers clustered at the top instead of at each internode. Three species :—

1. I. linearis ... Flowers purple.
2. I. fusiformis ... Flowers rosy.
3. I. ramosus

13. Epidendrum.—One of the largest genera in the order; all the epiphytal orchids being at first called by the name of Epidendr*on** meaning plants living upon trees. The species vary greatly in size and habit but all agree in having the terminal inflorescence. They may be divided into two great classes, those with and those without pseudo-bulbs. The most showy approach Cattleya, being sometimes difficult to distinguish when not in flower, in fact except for their extraordinary brilliancy of colour, and size, there is little to distinguish the Cattleyas, some botanists still considering them as highly developed Epidendrums. Among the species worth cultivating are E. bifidum, E. ciliare, E. fragrans, E. ionosmum, E. imatophyllum, and E. Schomburgkii. Forty-four species:—

1. E. bifidum	... Pseudo bulbs; flowers purplish green, lip rose, orange and white.
2. E. ciliare	... Pseudo-bulbs; flowers white, lip fringed.
3. E. fragrans	... Pseudo-bulbs; flowers white, scented, lip striped with violet.
4. E. Oncidioides	... Pseudo-bulbs; flowers yellow, spotted with brown.
5. E. graniticum	... Considered a variety of the last: flowers yellowish green, spotted with red.
6. E. clavatum	... Pseudo-bulbs; flowers white with purple bracts.
7. E. pictum	... Pseudo-bulbs; flowers dull yellow.
8. E. pachyanthum	... Pseudo-bulbs; flowers straw-colour.
9. E. ionosmum	... Pseudo-bulbs; flowers reddish-green, lip white striped with deep rose.
10. E. chloroleucum	... Pseudo-bulbs; flowers yellow-green, small.
11. E. viviparum	... Pseudo-bulbs; flowers white, on a very long stem.

* In our first paper we used the termination *on*, but, following the best authorities, now substitute *um*.

12. E. saxatile ... Pseudo-bulbs; flowers reddish-purple.
13. E. variegatum ... Pseudo-bulbs; flowers variegated, greenish white with purple spots and dashes
14. E. prismatocarpum ... Pseudo bulbs; flowers yellow, green and purple, lip lilac-purple with a white border.
15. E. tetrapetalum ... Pseudo-bulbs; (Oncidium ?)
16. E. Schomburgkii ... Leafy stems; flowers vermillion.
17. E. imatophyllum ... Leafy stems; flowers pale rose.
18. E. stenopetalum ... Leafy stems; flowers purple.
19. E. nocturnum ... Leafy stems; flowers white.
20. E. longicolle ... Leafy stems; flowers pale yellow.
21. E. elongatum ... Leafy stems; flowers bright rose.
22. E. patens ... Leafy stems; flowers rusty yellow.
23. E. rigidum ... Leafy stems; flowers greenish inconspicuous.
24. E. durum ... Leafy stems; flowers yellow.
25. E. raniferum ... Leafy stems; flowers green with purple dots.
26. E. umbellatum ... Leafy stems; flowers greenish.
27. E. ramosum ... Leafy stems; flowers greenish white, very small.
28. E. scutella ... Leafy stems; flowers greenish yellow.
29. E. flexuosum ... Leafy stems; flowers greenish, lip white, fringed.
30. E. fuscatum ... Leafy stems; flowers yellowish-brown.
31. E. strobiliferum ... Leafy stems; flowers white.
32. E. smaragdinum ... Leafy stems; flowers bright green.
33. E. microphyllum ... Leafy stems; flowers small, purple.
34. E. dichotomum ... Leafy stems; flowers yellowish-green.
35. E. ellipticum ... Leafy stems; flowers rosy.
36. E. globosum ... Leafy stems; flowers very small, green.
37. E. diceratum ... Flowers pink.
38. E. sessiliflorum ... Flowers brownish-white.
39. E prostratum ... Leafy stems; flowers in a panicle, green.
40. E. violescens ... Leafy stems; flowers very small with violet bracts.
41. E. tigrinum ... Flowers yellow and red.
42. E. alsum ... Leafy stems; flowers fleshy small.

43. E. im Thurnii ... Leafy stems; flowers very small.
44. E. montigenum ... Leafy stems; flowers very small.

14. Cattleya.—This genus, taken altogether, is quite distinct, although some of the species of Epidendrum approach it very closely. The flowers are always showy, borne on the apex of club-shaped pseudo-bulbs and accompanied by one or two thick rigid leaves. Some of the species have exceedingly beautiful flowers. Two species :—

1. C. violacea (superba) ... Two leaves; flowers rosy purple.
2. C. Lawrenciana ... One leaf; flowers purple lilac.

15. Lælia.—A genus very nearly allied to Cattleya and like it containing also some species with magnificent flowers. One species was recorded by SCHOMBURGK, from Roraima, but it does not appear to have been found by later collectors.

1. L. pumila ... Flowers single, rosy, with crimson lip.

16. Brassavola.—Pretty plants with short stems, each bearing one cylindrical or narrow leaf, at the base of which one or more white or creamy yellow flowers are produced. Although not showy they are well worth cultivating :—

1. B. cucullata ... Flowers single, white, lip fringed.
2. B. angustata ... Flowers clustered, white, lip fringed.
3. B. nodosa ... Flowers clustered, greenish-yellow, lip entire.

17. Schomburgkia.—Very tall plants of a similar habit to Cattleya. The flowers are clustered at the top of long stems, are dull in colour and the divisions much curled, very insignificant as compared with the size of the plants. Two species :—

1. S. marginata ... Flowers yellow, spotted with red.
2. S. crispa ... Flowers yellow, spotted with brown.

Tribe 2.—Vandeæ.

1. Galeandra.—A genus of very handsome plants, the flowers borne on the top of fleshy leafy stems in drooping clusters, the lip bell or funnel shaped with a spur. Four species :—

1. G. Baueri ... Flowers yellow, with purple lines on the lip.
2. G. Devoniana ... Flowers chocolate, lip white with pink lines.
3. G. dives (cristata) ... Flowers pink and dark purple.
4. G. juncea

2. Polystachya.—Rather insignificant plants with yellow flowers growing in simple or branching spikes at the top of leafy stems. Two species :—

1. P. luteola ... Flower stems branching.
2. P. species ? ... Flower stems simple

3. Cyrtopodium.—Magnificent plants with tall branching panicles or simple spikes of (generally) showy flowers, rising from the sides of depressed or elongated pseudo-bulbs. They are common on the sand-reefs, some of the species having pseudo-bulbs two to three feet high and panicles of brilliant yellow flowers standing five or six feet above the ground ; the most showy of the sand orchids. Five species :—

1. C. Andersonii ... Flowers yellow, wavy.
1. C. cristatum ... Flowers yellow, lip crested.
3. C. punctatum ... Flowers yellow, dotted with red.
4. C. parviflorum ... Flowers yellow, smaller than the others.
5. C. (Cyrtopera) Woodfordii Flowers greenish yellow with dark crimson lip.

4. Zygopetalum.—Epiphytes with pseudo-bulbs, thin leaves and handsome flowers from below the bulbs. The lip is almost flat and is therefore very conspicuous. Eight species, the two last formerly placed in Huntleya :—

1. Z. rostratum ... Flowers white, lip white with a violet crest.

2. Z. Mackaii ... Flowers green, barred with chocolate, lip white streaked with lilac.
3. Z. cochleare ... Flowers whitish, lip variegated with blue.
4. Z. Burkei ... Flowers blackish purple, lip white with purple stripes.
5. Z. tricolor ... Flowers greenish white, lip crimson.
6. Z. venustum
7. Z. violaceum ... Flowers violet.
8. Z. sessiliflorum ... Flowers violet almost stemless.

5. Aganisia.—Pretty little plants with delicate flowers, resembling the Zygopetalums in habit, but smaller. Three species :—

1. A. pulchella ... Flowers white with a yellow blotch on the lip.
2. A. graminea ... Flowers yellow, spotted, with red.
3. A. fimbriata ... Flowers white, lip blue, fringed.

6. Acacallis.—A single species, separated from Aganisia, with tufted leaves and a spike of flowers 18 inches long :—

1. A. cyanea ... Flowers white, blotched with blue and yellow.

7. Batemannia.—The only species is a small plant with four-angled pseudo-bulbs and a nodding spike of almost unique coloured flowers.

1. B. Colleyi ... Flowers reddish-brown.

8. Bifrenaria.—Rather pretty plants with pseudo-bulbs and thin ribbed leaves. Flowers small, in spikes, with spurs. Two species :—

1. B. aurantiaca ... Flowers orange with crimson spots.
2. B. longicornis ... Flowers pinkish, spotted with brown.

9. Lycaste.—The only native species is generally known by the name of Paphinia. It is a small plant with thin delicate leaves and bluntly two-edged pseudo-bulbs, from below which proceeds a drooping spike of two or three large and handsome flowers :—

1. L. cristata ... Flowers pale, blotched and barred with crimson.

10. Gongora.—Fine plants with large pseudo-bulbs, ribbed leaves, and limp pendulous flower spikes, along which are ranged curious grasshopper-like flowers. The flowers vary much in their markings and colours, and although rather small and generally dull tinted they are interesting and curious. Five Guiana species have been recorded but it is doubtful whether they can be considered more than varieties ;—

1. G. atropurpurea ... Flowers dark crimson.
2. G. maculata ... Flowers yellow or white, more or less spotted.
3. G. variegata ... Flowers variegated.
4. G. histrio.
5. G. quinquenervia ... Flowers yellow and purple.

11. Coryanthes.—This genus is perhaps the most interesting of the whole order. The native species have pendulous flower-stems proceeding from the base of tapering, conical, channelled pseudo-bulbs, and thin ribbed leaves. They grow on saplings or bush-ropes, the aerial roots forming oval masses in which live colonies of black ants. The flower buds resemble a swathed Chinese lady's foot, the bands or outer divisions of the flower turning back as they open, disclosing a most extraordinary development of the lip. This lip is turned back upon itself to form a cup, above and at one side of which for a handle as it were is a short column bearing a mushroom-like expansion at the apex, below which are two small horn-like processes which distil a mucilaginous liquid into the cup. The flowers are large and handsome, not so showy as some others, but far more interesting. Three species have been recorded, but C.

speciosa and C. maculata appear to run into each other, in fact, like most other orchids every plant differs in some way from another. When not in flower however the two above-mentioned are exactly alike, but they can be easily distinguished from C. macrantha by their narrower leaves and sharp edges to the flutings of their pseudo-bulbs :—

1. C. macrantha	... Flowers very large, cap deep orange, velvetty, cup pale rose blotched with crimson.
2. C. speciosa	... Flowers about half the size of the first, cap yellow, smooth, cup pale more or less spotted with rose.
3. C. maculata	... Similar in size to No. 2, with the cap purple and other parts of the flower yellow, dotted or blotched with crimson.

12. Stanhopea.—Very beautiful plants with extraordinary shaped flowers on short stems coming from below conical pseudo-bulbs. The flowers are large, highly scented, waxy in texture, and the leaves ribbed. Four species :—

1. S. eburnea	... Flowers waxy-white with a touch of violet on the slipper-like lip.
2. S. grandiflora	... Hardly distinguishable from No. 1 except by a little more colour on the lip.
3. S. insignis	... Flowers pale yellow, spotted with violet.
4. S. oculata	... Flowers creamy white spotted with lilac, lip with two or four blackish eye-like spots.

13. Peristeria.—Large plants with slightly compressed, tapering pseudo-bulbs, from the base of which proceed (in the Guiana species) short nodding flower-spikes. The flowers are pale and almost globular in shape, the lip small somewhat resembling a dove nesting within,

from which one species, not native, has received the name of Dove Orchis. Three species :—

1. P. cerina ... Flowers yellow.
2. P. pendula ... Flowers white, spotted with lilac.
3. P. selligera ... Similar to the last but with slight differences in the shape of the lip and column.

14. Catasetum.—This is perhaps the most interesting genus in the whole order to the botanist, as several species have apparently the power of producing different shapes and sexes of flowers according to circumstances. The typical form of flower has a pouch or hood-like lip, widening in front, and placed upside down as it were, with the column below instead of above as in most orchids. This, the female, is common to most of the species and probably to all, although it has not yet been recorded from more than about half. In the case of Catasetum macrocarpum this form was, when discovered, made the type of the genus Monachanthus and named M. viridis. It is borne upon shorter flower-stems than the other forms and in the forest is often found bearing numbers of its very large capsules. The second form is doubtful as to sex but is probably male, and in the species in question was named C. tridentatum. It may be compared in shape to a sun-bonnet and is more showy than the Monachanthus. Finally we have the Myanthus form, originally put in a separate genus under the name of M. barbatus. This is distinctly male and its lip is flat, fringed, and in its normal position. When out of flower the species are hardly recognisable from each other, all having fleshy cylindrical pseudo-bulbs with a double rank of leaves. Even the female flowers closely resemble each other and it is therefore

by the male that they can be best distinguished, the intermediate form being apparently confined to C. macrocarpum. Sixteen species, the first three growing on sand and nearly allied :—

1. C. discolor	... Flowers yellowish green, hood slightly fringed.
2, C. cristatum	... Flowers green, fringed at the crest.
3. C. fimbriatum	... Flowers pinkish-white, much fringed.
4. C. macrocarpum	... Flowers green, blotched with crimson.
5. C. trifidum	... Similar to the last, lip of male flower with a white fringe.
6. C. cornutum	... Male flower ; lip fringed, heart-shape with a horn-like appendage.
7. C. saccatum	... Male flower ; lip bag-like, fringed.
8. C. deltoideum	... Male flower ; lip flat, triangular.
9. C. poriferum	... Male flower ; lip flat, heart-shaped.
10. C. luridum	... Male flower ? lip bag-like.
11. C. barbatum	... Male flower ; lip bearded with fleshy hairs
12. C. Darwinianum	... Male flower ; lip oblong, green with dark spots.
13. C. recurvatum	
14. C. planiceps	... Male flower ; lip roundish, compressed, serrated.
15. C. scurra	... Male flower ? white, lip fringed.
16. C. longifolium	... Leaves long, ribbon-like, flowers orange scarlet.

15. Cychnoches.—Another interesting genus, in habit much like Catasetum, the flower-stems borne on the sides of the pseudo-bulbs above the base but not on the apex. The flowers have been compared in shape to a swan, the long arched column forming the neck and the remainder of the flower the body. Three species, all handsome :—

1, C. Loddigesii	... Flowers brownish green, lip white with crimson spots.
2. C. chlorochilon	... Flowers yellow.
3. C. purpureus	... Flowers purple.

16. Polycycnis.—Rather pretty plants, removed from the genus Houlettia. One species, having conical pseudo-bulbs, from the base of which rises an upright flower spike :—

1. P. vittata ... Flowers yellow, striped with chocolate.

17. Stenia.—Without pseudo-bulbs ; the leaves spreading like a fan, and the single flowers rising from their axils. One species, neither showy nor particularly interesting :—

1. S. pallida ... Flowers pale, almost colourless.

18. Scuticaria.—Curious looking plants with cylindrical leaves hanging downward to a length of four or five feet ; flowers on very short stems, large, handsome and highly scented. One species —

1. S. Steelii ... Flowers pale yellow, blotched with purple.

19. Maxillaria.—A large genus of weedy-looking plants with insignificant flowers, the lip of which resembles a palate or lower jaw, from which its name is derived. The flowers are usually borne singly, often hidden among the leaves and rising from the base of pseudo-bulbs which are generally small in proportion to the size of the plant. Twenty-three species have been recorded, these varying much in size and general appearance, from two or three inches to as many feet in height, in some cases creeping or trailing and in others forming great masses :—

1. M. alba ... Flowers white.
2. M. cristata ... Flowers white, spotted with crimson, lip fringed,
3. M. Parkeri ... Flowers white, spotted with purple, lip lilac.
4. M. Henchemanni ... Flowers purple.
5. M. chlorantha ... Flowers yellowish-green.
6. M. foveata ... Flowers clustered, straw coloured.

7. M. porrecta	... Flowers pale, purple spotted.
8. M. densa	... Flowers clustered, white spotted with red.
9. M. pumila	... Flowers purple.
10. M. uncata	
11. M. acutifolia	... Flowers brown.
12. M. Batemanii	
13. M. Guyanensis	
14. M. graminea	... Flowers yellow, spotted with red.
15. M. sinuosa	... Flowers striped.
16. M. eburnea	... Flowers white.
17. M. gracilis	... Flowers red.
18. M glauca	... Flowers yellow.
19. M. pallens	... Flowers pale white.
20. M. crassifolia	... Flowers yellow.
21. M. bicolor	... Flowers yellow, with a blackish-purple lip.
22. M. iridifolia	... Flowers yellow, spotted.
23. M. discolor	... Flowers orange.

20. Camaridium.—Allied to Maxillaria. One species has been recorded from Guiana, a straggling plant with branching leafy stems and rather pretty flowers, which only last a day :—

1. C. ochroleucum	... Flowers white, with a yellow lip.

21. Dichæa.—Pretty little plants with leafy stems and small flowers proceeding from the axils of the leaves. Six species :—

1. D. echinocarpa	... Flowers white, capsule prickly.
2. D. graminoides	... Flowers whitish, capsule smooth.
3. D. ochracea	
4. D. Wiegeltii	
5. D. Splitgerberi	
6. D. Kegelii	

22. Ornithidium.—A single species, allied to Maxillaria, with pseudo-bulbs, and flowers borne on comparatively long stalks, singly :—

1. O. coccineum	... Flowers crimson.

23. Eriopsis.—A single species with thin ribbed leaves on the top of a fleshy oblong stem; flowers spike from the base, long:—

1. E. Schomburgkii ... Flowers orange.

24. Trichocentrum.—A genus of small plants with comparatively large flowers, very neat and pretty. The pseudo-bulbs are almost obsolete, the leaves thick, and the nodding flowers provided with spurs at the back. Two species:—

1. T. iridifolium ... Flowers yellow.
2. T. recurvum ... Flowers white, lip purple.

25. Rodriguezia.—Small plants with handsome flowers borne on stems proceeding from below small pseudo-bulbs which bear thick leathery leaves. The first species has a one-sided spike of small deep rose-coloured flowers, while the others, formerly placed in a genus called Burlingtonia, bear fewer but much larger white flowers:—

1. R. secunda ... Flowers deep rose.
2. R. candida ... Flowers waxy white with a tinge of pale yellow down the centre of the lip.
3. R. fragrans ... Similar to the last but larger and more fragrant.
4. R. venusta ... Flowers white tinged with pink.

26. Aspasia.—One species, a plant with two-edged pseudo-bulbs, from below which rise flower-stems bearing two or three not very conspicuous flowers.

1. A. variegata ... Flowers greenish, lip white, violet-spotted.

27. Odontoglossum.—A genus well-known among orchid growers, and which unfortunately is sparsely represented here, the most handsome species being only found on mountains. They are characterised by having two or more tooth-like warts at the base of the lip, and

have pseudo-bulbs, from below which rise the flower-spikes. Two species :—

1. O. citrosmum ... Flowers waxy-white with a rosy lip.
2. O. epidendroides ... Flowers yellow, dotted with purple.

28. Oncidium.—A large genus containing some very fine plants, characterised by having a little pile of excrescences on the base of the lip. The species vary in size from an inch or two high (O. iridifolium) to as much as ten or twelve feet (O. altissimum). Some are provided with monster pseudo-bulbs, while others are destitute of these and have thick leathery leaves. The flowers are generally of some shade of yellow with crimson markings and are borne on spikes or panicles. Fourteen species :—

1. O. Lanceanum ... Without bulbs, leaves leathery, flowers pale yellow blotched and barred with chocolate, lip violet.
2. O. luridum ... Similar to the last but flowers smaller borne on longer flower-stems and dull in colour.
3. O. sanguineum ... Without bulbs, flowers-stems very long, flowers straw colour and crimson.
4. O. tetrapetalum ... Without bulbs, flower yellow, spotted with brown.
5. O. variegatum ... Without bulbs, flowers white, spotted with rose.
6. O. pulchellum ... Without bulbs. leaves awl-shaped triangular, flowers pale rose, with crimson markings.
7. O. nanum ... Without bulbs, leaves oval, concave, flowers white.
8. O. iridifolium ... Very small, without bulbs, leaves spreading like a fan, flowers yellow.
9. O. altissimum ... Pseudo-bulbs large, flower-stems 8 to 12 feet high, flowers yellow, orange spotted.

10. O. Baueri ... Similar to the last, differing in the column
11. O. lunatum ... With bulbs, flower-stems rising a little beyond the leaves, flowers yellow, orange spotted.
12. O. Pirarense
13. O. nigratum ... With bulbs, flowers crimson, brown spotted.
14. O. orthostates. ... With bulbs; flowers green, brown spotted.

29. Brassia.—Handsome plants with pseudo-bulbs, and flowers in spikes, generally yellow, with brown dots. The two lower floral divisions (petals), are always longer than the upper, sometimes very long and tail-like. The two ranks of flowers on arching stalks, highly perfumed, make the Brassias very desirable, especially as they flower freely. Six species:—

1. B. cochleata ... Lip broader than long, petals equal with the lip.
2. B. Lanceana ... Lip oblong, wavy, shorter than the petals.
3. B. Lawrenciana ... Similar to the last, hardly more than a larger and finer variety.
4. B. caudata ... Lip ovate, petals very long.
5. B. verrucosa ... Lip oblong, curled, covered with shining warts.
6. B. odontoglossoides

30. Trizeuxis.—A single species, without pseudo-bulbs, with narrow sword-shaped leaves and insignificant clustered flowers:—

1. T. falcata ... Flowers greenish.

31. Trigonidium.—Rather peculiar looking plants for orchids as the flowers are almost regular, the outer divisions enclosing the lip and petals, making the flower appear something like a crocus, which resemblance is increased by each being borne on a stalk by itself. All the species have pseudo-bulbs and yellow flowers. Four species:—

1. T. Egertonianum ... The largest species, with bulbs and leaves the size of a Brassia.
2. T. acuminatum ... Much smaller, leaves narrow, sepals pointed.
3. T. obtusum ... Similar to the last but sepals blunt.
4. T. tenue ... The smallest species.

32. Ionopsis.—Very pretty little plants without pseudo-bulbs, having narrow fleshy leaves, from below which rise slender branching flower stems, bearing scores of violet-like flowers. Two species :—

1. I. utricularioides ... Leaves linear, flower stem branched.
2. I. teres ... Leaves cylindrical, flower stem simple.

33. Ornithocephalus.—Pretty dwarf plants without pseudo-bulbs, the thick fleshy leaves spreading in the shape of a little fan, from the axils of which proceed short stems bearing two or three flowers, the shape of which has been compared to a bird's head with beak. Three species :—

1. O. gladiatus ... Flowers white.
2. O. trichorhizus ... Flower straw-colour.
3. O. ciliatus

34. Quekettia.—The only species is a pretty little plant about four inches high with cylindrical leaves and a branching flower-stem :—

1. Q. microscopica ... Flowers yellow.

35. Lockhartia.—Pretty plants with compressed leafy branching stems and flower stems proceeding from the axils of the upper leaves. They have been called "Alligators' tails" in the colony from the shape of their leafy stems. Two species :—

1. L. elegans ... Flower-stems simple, flowers yellow with purple spots.
2. L. acuta ... Flower-stems branching, flowers yellowish white.

36. Angræcum.—The native species are inconspicuous, and may be recognised by their close spikes of small flowers, with spurs. Two species:—

1. A. fasciola ... Stems leafy branching, flowers white.
2. A. filiforme ... Plant reduced to a bunch of aerial roots, flowers yellow.

37. Macradenia.—The only species is an inconspicuous plant with pseudo-bulbs, and small flowers borne on a drooping raceme.

1. M. triandra ... Flowers greenish, spotted.

38. Notylia.—Rather pretty little plants with very small, almost obsolete pseudo-bulbs, and short thick leaves from amongst which hang drooping flower-stems bearing a great number of small flowers. Four species:—

1. N. punctata ... Flowers whitish, spotted.
2. N. micrantha ... Flowers pale green.
3. N. tenuis ... Flowers yellow.
4. N. Parkeri

Tribe 3.—Neottieæ.

1. Vanilla.—This genus is easily recognised by its climbing habit, fleshy stems and thick leaves. The flowers are borne in clusters and are of a fair size, but usually dull in colour. Four species:—

1. V. bicolor. ... Flowers dull red.
2. V. planifolia ... Flowers yellowish green, lip white.
3. V. anaromatica ... Flowers greenish white.
4. V. palmarum ... A dwarf species found on the eta palm.

2. Sobralia.—Large semi-terrestrial plants with hard wiry stems and bamboo-like foliage. The flowers are generally large and handsome, but last only a very short time. Three species:—

1. S. liliastrum ... Stems 8 to 12 feet high, flowers rosy.
2. S. sessilis ... Stems 4 to 6 feet, flowers deep rose.
3. S. stenophylla

3. Epistephium.—The only species found in Guiana

resembles in habit a young palm; the flower-spike proceeding from the base and the flowers opening at intervals:—

1. E. parviflorum ... Flowers almost hidden, white.

4. Wullschlægelia.—A single species, a tiny saprophyte growing on the ground in the forest. The whole plant consists of a leafless stem about six inches high with a few small flowers at the top:—

1. W. aphylla ... Flowers pale white.

5. Stenoptera.—Semi-terrestrial plants growing among mosses, with rosettes of leaves, and inconspicuous flowers in spikes. Two species:—

1. S. viscosa ... Flowers pale.
2. S. adnata ... Flowers greenish white.

6. Neottia.—Allied to the next genus. Terrestrial plants with inconspicuous flowers. One species:—

1. N. lanceolata

7. Spiranthes.—Terrestrial plants with thick fleshy roots, and clustered leaves which often wither before the flower stem is produced. Spikes sometimes spirally twisted, flowers half hidden among bracts. None of the species are showy although one is worth growing for its white-spotted foliage. Six species:—

1. S. bicolor ... Spike spirally twisted, flowers small greenish, lip white.
2. S. picta ... Spike not twisted, flowers larger, similar in colour to the last.
3. S. elata ... Spike twisted, flowers small greenish.
4. S. tenuis ... Spike not twisted, flowers white shining.
5. S. Hostmanni ... Spike twisted, flowers very small greenish.
6. S. orchioides ... Spike not twisted, flowers lurid.

8. Pelexia.—A genus allied to the above. One species:—

1. P. aphylla.

9. Pogonia.—This genus contains the most showy terrestrial orchids found in Guiana, including species formerly called Cleistes, the flowers of which are as handsome as some of the Cattleyas. The flowers are borne on the top of leafy stems, two or three together. Four species :—

1. P. rosea ... Flowers bright rose, large.
2. P. lutea ... Flowers yellow, large.
3. P. Surinamensis ... Flowers rosy, about half an inch across.
4. P. parviflora.

Tribe 4.—Ophrydeæ.

1. Habenaria.—Terrestrial plants, distributed all over the world, with underground tubers and leafy stems, bearing spikes of greenish white or white flowers on the top; lip with a spur, which is very long in some species. Mostly inconspicuous but some of them are rather pretty when in flower. Nine species :—

1. H. longicauda ... Lip divided into three segments, spur very long.
2. H. seticauda ... Lip incurved, spur very long, pointed.
3. H. Schomburgkii ... Lip divided, spur short.
4. H. heptadactyla ... Flowers few, spur short.
5. H. Demerarensis ... Flowers small, spur short.
6. H. pauciflora ... Lip divided, spur short.
7. H. macilenta ... Lip divided, spur club-shaped.
8. H. parviflora ... Flowers very small.
9. H. Moritzii ... Lip divided, spur short.

Tribe 5.—Cypripedieæ.

1 Selenipedium.—This genus is allied to the well-known "Lady's slipper," of which so many species are in cultivation. The species are terrestrial, having fibrous roots, and leaves either clustered or borne on long wiry stems. The floral lip is always more or less pouch-like resembling the front of a shoe, from which the name is derived. Four species :—

1. S. palmifolium ... Flowers straw-colour, yellow.
2. C. Lindleyanum ... Flowers reddish brown, lip green.
3. S. Kaieteurum ... Similar to the above; a doubtful species
4. S. Klotschyanum

*Richard Schomburgk's Account of Roraima.**

Translated by Mrs. M. H. von Ziegezar.

THE beauty of the valley of the Kukenaam as well as the friendly welcome which we met with from its inhabitants, the Arekunas, made us fix upon this spot for our headquarters during the time we should remain in the neighbourhood of the Roraima, which was now rising in its full majesty at a distance of only a few miles to the north-east. We had chosen a picturesque spot. On the left bank of the Kukenaam, which winds here through innumerable quartz and jasper boulders, the mountain savannah rose destitute of every trace of tree or shrub, and to the N.N.E. the red walls of the Roraima and Kukenaam were almost perpetually shrouded in a thick mass of clouds.

As the neighbourhood harbours but few mammals and birds, and as the mountain rivers contain also but few and small fishes, of the size of a finger and belonging chiefly to the family of the siluri, the Arekunas depend almost exclusively on vegetable food.

In spite of this, they love their home, and more particularly the Roraima, with an attachment equalled only by the passionate love of the Swiss for their Alps.

The Roraima is the subject of all their festive song. Tell them about the beauties of Pirara with its vast savannahs, its numerous herds of cattle, its deer; about the enormous fish in its rivers, the abundance of food, and they will answer you: "It cannot be a

* Reisen in Britisch-Guiana, Vol. ii. Chapter 7, (part only).

beautiful country because there is no Roraima." Every morning and evening, when old and young, headed by their chief KAIKURANG, passed by our huts with the "*Bakong baimong*" (good day), or "*Saponteng*" (good night), they never failed to add the words: "*Matti Roraima-tau, Roraima-tau*" (look at our Roraima), pronouncing the word *tau* very slowly and solemnly.

The climate and the atmospheric conditions of our settlement were far from having our approval. "Our Village" as we had named the six little huts forming our headquarters, lay in 4° 57′ of northern latitude and 61° 1′ of western longitude, about 3,300 feet above the level of the sea.

In the morning between 4 and 5 o'clock, the thermometer only once or twice went up to 58°; at noon in the shade to 87° and in the sun rarely higher than 100° Fahrenheit. Besides these differences of temperature there were almost continual changes of light and shade, fog, rain and sunshine. Before sunrise and until about half an hour afterwards, the sky, except for a few transparent cloudlets, kept absolutely clear. The mighty mountain giant Roraima was then unveiled and stood out with its straight lined contours against the blue sky. But soon the mist began to rise from the plains and valleys, and quickly spreading in all directions it was lifted by a sudden gust of wind into the upper regions, from whence it returned in violent showers to the ground. Then there followed in quick succession short periods of bright clear sunshine, the sun warming for a minute the atmosphere previously cooled by the rain, and then hiding again behind heavy storm clouds.

Sometimes the rising mist would spread over only small districts, the Roraima for instance getting enveloped in a thick layer of clouds, while the bronze coloured rocks of the neighbouring Kukenaam were reflecting the bright rays of the sun, or these huge blocks of sandstone lay hidden in a gloomy ocean of mist while their steep red summits were lit up by glaring sunlight.

In an equally abrupt manner the air currents used to change. Only this minute all nature might seem at peace. Not a breath of wind was stirring. I was busily profiting by the bright quiet moments to dry my damp blotting paper for the herbarium, including advertisement sheets of the London *Times*, of which I had bought up a stock in London for drying my plants, when a sudden whirlwind carried them up by a spiral motion, driving them off for miles and miles, amid the delighted shouts of the Indians but to my own bitter mortification. Many times on our excursions we encountered them again streaming in the wind among the branches of the trees or lying on the ground. At a height of 4,000 feet when ascending the Roraima, I still met some of them drifting towards me before the wind.* Amidst continual changes the day advanced to three o'clock in the afternoon. Then almost regularly a wild thunderstorm came on, accompanied by a violent downpour of rain. If this finale was delayed until 5 o'clock in the afternoon it was sure not to occur. The storm discharged itself amidst frightful thunderings and once more the setting sun poured his magic light on the red walls of Roraima and Kukenaam, while the silvery gleam of the foaming

† What became of some of these sheets is told by Appun (See *Timehri* 1893, p. 342).

cascades and cataracts, swollen by the preceding rains, rushed down from the glistening summit to afford an exquisite contrast. I mentioned already that the annual rainfall on the coast and in the savannahs amounts to about 100 inches; here it is surpassed by far, and well may the Indians call the Roraima the fruitful mother of rivers.

However anxious we were to ascend the Roraima, we had to delay this until our ambassador to the Seekongs should come back, as according to the Indians we should find neither fruit nor game to appease our hunger on the way. Meanwhile I took some rambles through the surrounding country in order to explore its fauna and flora. The former proved scanty enough, as the whole of the neighbourhood was just as devoid of mammalia and birds as the mountain tracts which we had just past. I was however richly repaid by the abundant vegetation which prevails here. The mountain slopes—the banks of the river and streams—the woody oases—displayed such a wealth of forms, species and families, as never before had met my eyes. This fertility of the soil rendered the scarcity of animals the more striking. Now and then we met a stray Aguti, rarer still a Laba or a flock of the before mentioned Mycetes and of a species of Cebus. Then there was a certain ratlike animal which later on was brought us alive and which we took to be Cavia leucopygia. Occasionally we met an Ant-eater (Myrmecophaga tridactyla) or a Nasua. Of birds we met Penelope, rarely Rhamphastos and more frequently Euphone, Tanagra, Pipra, and Nectarinia, among which the pretty Tanagra punctata, spotted green and black, the seven-coloured

speckled Tanagra tatao, and the pink-headed Pipra cornuta and serena were conspicuous.

The large owl (Strix torquata,) and one Ralle (Crex Schomburgkii) of the size of a sparrow, were the only representatives of the higher classes of animals. The latter, a new species, was always to be found in pairs. Its forehead is red like iron rust, its wings dark brown, the upper side of its body shows small white specks beginning at the back of its head in closely crowded tiny dots, increasing in size and spreading over the whole of its back and wings. Its throat is white, the breast the colour of iron rust, the abdomen whitish, and the feet have a yellowish colouring. The pretty little creatures are very easily caught, as their flying capacities only carry them a little distance and they consequently try to hide in the grass. I managed to keep a cock and hen for a pretty long time in a cage, but the cock escaped one day, and the hen died of grief the day after.

The numbers of berry bearing trees, especially of the family of Laurineæ and Sapindaceæ which are to be found here may account for the presence of Penelope. The Penelope is an exceedingly cautious and shy bird, the only chance for getting a shot at it being when it feeds, during which time from 6 to 10 birds always collect on one tree. If you come upon them under such circumstances you may succeed in killing 3 or 4 of them before the other birds notice it and take to flight. The bird that has been hit by the noiseless little arrow drops from the tree without its companions allowing themselves to be disturbed in their feast beyond looking after it with outstretched necks to inquire timidly the cause

of its disappearance. Should they find this out they hasten with uncommon swiftness from one branch to the other towards the thick foliage of the tree-tops, either to hide there or to fly from thence to the next tree and so on. They build their nests on the ground, but as soon as their young ones have acquired some skill in using their wings they lead them from one bush to the other until they can reach the branches of a tree. Except at daybreak their strange rattling voice is never heard. The flesh of the older birds is edible only if they have been killed by a poisoned arrow dipped in Urari, which poison renders the otherwise tough flesh perfectly tender.

The entire absence of beasts of prey in the high regions inhabited by the Arekunas may account for their using only the blowpipe for shooting purposes, which weapon they handle in such a masterly way as to hit their mark at a height from 150 to 180 feet. I already mentioned that the Indian prefers increasing his stock of domestic animals by getting them when very young and when sucklings, and handing them over to the maternal cares of his wife. I here witnessed in what manner the Arekunas proceed to tame an old stubborn monkey. If they wish to take one of these animals alive they cover the arrows with diluted poison, which only stupefies the monkey. If in this condition the monkey drops from the tree they immediately suck his wound, bury him up to his throat into the ground, and make him swallow a strong solution of nitrous earth, or if this is not at hand sugar or cane juice. As soon as the patient has half recovered his senses, he is taken out of his temporary grave and is tightly bound up in palm leaves after the

manner of swaddling clothes; every movement is made impossible to him. In this strait waistcoat he remains for some days; he is made to drink cane juice, and eat meats cooked in nitrous solution and highly seasoned with capsicum. This drastic treatment still failing in its effect, the unruly patient is at every outbreak of his wild fury hung up for a short time above a smoky fire. Very soon his frenzied rage will soften, his eyes, which shot malicious venom only a few minutes ago, become mild and humbly pray for deliverance. His fetters are now loosened, all memory of bygone times is gone, and the greyest and morosest of monkeys becomes as tame as if he had never frolicked about in the forest. According to Professor POPPIG the same proceeding is used by the Indians on the banks of the Huallaga, whenever they want to tame a monkey.

Of the above mentioned cavia, (C. leucopygia) we often had from 6 to 8 live specimens brought to us without our ever succeeding in keeping one of them alive, which seems to confirm the opinions of the Indians that they cannot be tamed. Though we had sometimes as many as ten or twelve, not one of them would be alive after the second or third day of their imprisonment. They live in caves, from out of which they are swamped with water and easily caught. They have a dark grey skin, rather whitish on the abdomen. Their forelegs are very short, only 3 inches long, the hindlegs somewhat longer. The female has only two nipples close to the flanks. Their silky coat is so delicately fixed to the skin that even the softest touch removes it, leaving a bare spot.

The scarcity of fish in the rivers I have already men-

tioned; the number of snakes in the valleys and on the river-banks was all the greater. Rattle snakes from 4 to 6 feet in length were brought to me. On one of our botanical excursions I myself came into contact with a huge Coulacanara (Boa constrictor), an encounter which might have led to most unpleasant consequences for myself but for the quick eye of my young companion, the Macusi MISSEGARAI, who noticed the animal before my touching it, as it lay entwined in a dense thicket of ferns (Mertensia) which enclosed the outskirts of a woody oasis, along which we were walking. The noise of our steps may have roused its attention, for with its head lifted above the thicket, it had very likely stared at us already for some minutes before MISSEGARAI noticed it and called my attention. Had I seen the object before, I should very likely have taken it for the end of an outstretching thin branch. We were without any weapons, and our village was too far away to enable us to fetch them from thence before sunset. In spite of MISSEGARAI'S fright and representations, as well as of the repulsion evidenced by our dog, I quickly made up my mind to at least make an attempt to kill the animal. A heavy club was soon found with which to begin the attack. MISSEGARAI seeing that no praying of his could detain me from the attempt withdrew from the supposed scene of combat. His dog followed him, his tail between his legs, and, sitting down beside him, he followed all my movements with the same intense watchfulness as that of his master. As yet the serpent kept its head immovable above the thicket. I cautiously drew near in order to reach it with my weapon and to disable it with one well aimed blow; but in the

very moment I raised my arm to do so, the animal disappeared beneath the green cover, and from the singular quick motion of the fern fronds I perceived that it was taking to flight. The close thicket prevented my getting near, but the motion of the leaves betrayed the direction which the animal had taken. It soon came towards the outskirt again close to which I hastened along keeping in the same line with it. All of a sudden the waving movement of the ferns stopped and the snake's head peeped through the leafy screen, probably to look out for its persecutor. A lucky blow hit it so hard that it fell back stunned, and before it had recovered several vigorous blows had already succeeded the first. Like a bird of prey I now flew at my victim, knelt down upon it and strangled it with both hands. When MISSEGARAI saw the real danger over, he hastened up on my calling out for him, loosened one of my braces, and laying a loop round the neck above my hands he pulled at it with all his might. The dense thicket hindered the animal considerably in its movements making it all the easier for us to master it. Only after we had finally succeeded in dragging it into the open space did I become aware with what a monster I had been fighting. The serpent measured twelve feet and a quarter long and was of an enormous strength. Though I have met with the Boa murina up to a length of twenty feet I have never found it of such enormous strength as the Boa constrictor of a length of from eight to ten feet. With the greatest difficulty, and with infinite precaution so as not to injure the skin, we dragged the animal to the village, which we reached, wet with perspiration. It had got too late already to skin it the same day, I therefore left

this work for the following. Having experienced already something of the indomitable vitality of snakes, I had become careful, and substituting the braces by a stronger sling, I fastened this latter to the doorpost.

Loud screams and uproarious laughter awakened me next morning; at the same time I heard a strange and loud hissing. I hastily jumped from my hammock and stepped outside the door. The snake had actually recovered and was now working with all its might to get loose from its fetters. A whole crowd of Indians had gathered round and were trying to provoke it into even greater rage. With its mouth open it emitted its unceasing sounds resembling the hissing of geese, its eyes looking all the time as if they were trying to force themselves out of their sockets. Its tongue was in uninterrupted motion. To put an end to its exertions, I shot it through the head, but unfortunately lost its lovely skin later on.

Among the insects we were particularly interested in the innumerable cicadas, which punctually every day at noon and again at 6 o'clock in the evening carried on their shrill concert. A choir of a thousand voices then filled the bushes, shrubs and trees, having however little charm for the listener. Simultaneously with the evening concert a bird, which I however never got to see in spite of all my efforts, uttered a shrill, whistling sound, resembling mostly the whistling of an engine. These animals commence their notes with the punctuality of a watch; the beginning of the concert varying only about two or three minutes at the most. Other animals again raised their voices at other definite hours, which enabled one even without a watch and without the sun being visible, to determine the time of the day. In the same way the

parrots announce the break of day by their hoarse cries, for every morning at the same hour they move from the upper woods to the lower places, and after having spent the day there they return just as regularly and as punctually to their roosting places a short time before sunset. LINNE suggested a floral clock, but the tropics possess an animal clock of far greater precision and reliability. Among the insects the curious Prionus cervicornus and a number of fine Buprestes occurred.

The scantier my zoological collection proved to be, the richer I found the flora. On the heights of the neighbouring mountain, the rivulets were mostly covered with the most charming floral specimens. Their summits and slopes displayed throughout a many-coloured sandstone of very brittle substance, ranged partly in horizontal layers, some having an inclination from South to East. In the riversheds also horizontal layers of a gravel-like, firm red sandstone occurred, underlying a mass of jasper pebbles of all sizes and colours; even the red jasper which I had seen on the Ruè-imeru fall was among them. I counted seven different colours, besides a beautiful kind with variegated bands, the colouring of which is exactly the same as the Siberian jasper, in consequence of which it was taken for the latter on our return back. In the savannah stray pieces of a green jasper as big as the fist were lying about which were used as flint by the Indians and eagerly gathered by the Macusis. The savannah itself was crossed by wide layers of clay with a rich admixture of gravel earth, jasper and feldspath.

The abundant and fairy-land like wealth of vegetation and the wildly romantic mountain masses, often formed

valleys of such bewitching loveliness that even the Indians, otherwise little susceptible to the beauties of nature, stood in speechless admiration. The discovery of more of these little paradises used to form the greatest treats in my botanical excursions. I shall never forget the magic surprise which I had one day while botanising at the wood clad foot of the Erematuri, when I found myself unexpectedly at the mouth of a narrow ravine down which a small mountain brook hastened to the Kukenaam, forming a hundred cascades in its mad course. In the river beds as well as on either side of the precipices bordering the valley, huge strata of a deep red sandstone stood out, now forming perpendicular walls, now terrace-like landings filled with high reeds, luxurious groups of bamboo and tree-ferns, with innumerable slender palms raising their lofty crowns above them or drooping over the roaring waters. The single bolders which rose above the river's bed were thickly overgrown with mosses, small delicate ferns and jungermannias, while from the walls of the rocky heights, treelike ferns (Dicksonia, Cyathea and Alsophila) overhung the ravine in all possible kinds of angles, forming the most exquisite roof of foliage which fancy could create. Through the mysterious darkness—for the rays of the sun tried in vain to penetrate this luxurious vegetation and to reflect in the cool brook—the crystalline waters were sparkling, roaring and splashing with bewitching voices, until, having reached the valley of the Kukenaam they still and speechless met their doom. Gigantic trees crowned the summit of the ravine with their tall, smooth and stately crested stems. On entering this lovely place, I was seized with the same awe and calm repose which

comes over one on entering a venerable old Gothic Cathedral.

A few days before starting for the Roraima the Indians, whom we had sent to fetch our luggage from the Torong-Yawise and who were to take it to the Roraima, arrived and were richly paid for their honesty and for the services which they had rendered us. They were sent back to their settlement on the following morning. If they had furnished us with a new proof of the faultless probity and honesty of the Indians, we were to experience during the following days also the extremely delicate and susceptible sense of honour among these children of nature. Among our Macusis there were three inhabitants of Nappi, who at every opportunity that offered itself managed to withdraw themselves from their work, and had already got several reprimands in consequence. This day all hands were required in order to complete the necessary preparations. Everybody came hurrying up and set vigorously to work, only three lazy ones remaining quietly in their hammocks. My brother sent for them, but all in vain. He next went himself to urge them on to assist in the work, but even this had no effect beyond their shaking their heads and remaining quietly in their hammocks. Indignant at their conduct, and remembering the excellent effect of a similar *coup de main* against the laziness of his attendants on his first journey, my brother quietly cut through the ropes with which the hammocks were fastened to the trees, which of course brought the lazy ones quickly to the ground and on to their feet. Quietly, and hiding their anger perfectly, they now set to work and did their duty without grumbling—but on the next morning they had

vanished without leaving a trace. Their dignity had been deeply wounded. Without food, and without having as yet received the slightest reward for their previous services, they had started back for Mappi during the night; they rather chose to suffer hunger, privation and trouble than to live any longer with him who had rendered them ridiculous.

The following day brought us the long expected arrival of our Serekongs. Headed by their chief, a venerable old man with long snow white hair, they entered our village. Curiosity had driven the hoary chieftain to undertake the long and troublesome journey in order to see the Paranaghieris, in spite of his old age, which betrayed itself especially in his emaciated body and wrinkled skin, far less so in the faded colour of his hair, for this sign of old age I had hitherto noticed in but one individual and a bald head I have never seen even with the oldest of Indians. The men had tidily combed back their long hair and plaited it into a long tail, which gave them an entirely Chinese look. But for this way of dressing their hair and some strange characters which they had painted on their bodies, they resembled in physique the Macusis and Arekunas. It was the same with the women, several of whom had brought over sick children, which they brought to us soon after their arrival, so that we might breathe on their faces and bodies and in this way restore them to health. Curiously enough, the breath is considered with them as well as with the Orientals as the emanation of the innermost faculties of the soul and mind! Our persons, and instruments and tools were, of course, also objects of the greatest astonishment and admiration to them—more than every-

thing else, our forks. Seeing us eating with them, they burst into loud derisive laughter, shaking their heads sarcastically and pointing to their fingers, which evidently they considered the most unsurpassable forks. As great as our expectations with regard to the provisions which they were supposed to bring along, had been, as sorely were we disappointed and we had therefore to start as early as possible for the Roraima.

Accompanied by some twenty Indians we started at daybreak on the 17th of November, in the best of spirits and full of excited expectations as to the events of the coming days, not thinking that the first day of our journey would be saddened in so mournful a way. We began by cutting through the magnificently wooded oasis bordering the western banks of the Kukenaam, which here forms a grand and picturesque waterfall of several cascades tumbling down with a thundering noise. A projecting height hiding the actual base of the Roraima lay in front, and above this arose the gigantic walls of the latter and of the Kukenaam, shining to-day in the bright morning sun without any trace of fog. To the North-West the Murre rushed over a mighty sandstone wall into the Kukenaam, overhanging which was an exquisite Leguminosæ in full bloom. Before crossing the Murre, the Indians drew our attention to a big sandstone block with hieroglyphics; on its surface we noticed several carved lines, about an eighth of an inch deep, looking just as if somebody had passed with both hands in a curvelike direction over the stone, leaving the impression behind. When MAKUNAIMA still walked on the earth, he passed by this spot and left this sign of his presence to the coming generations.

Having asked one of our companions who this MAKUNAIMA was, he answered without any hesitation "JESUS CHRIST."

After we had crossed the Murre we took a northwesterly direction through an undulating savannah. Here we encountered another small river about ten feet across which also hastened towards the Kukenaam. A big sandstone bolder lying in the middle of the river bed was already serving the foremost Indians as a crossing; they jumped from one side of the river on to it and then to the opposite bank, a manœuvre which all the rest imitated. I was the sixteenth in the line. Close behind me came the young Indian woman KATE, who shortly before our departure had been married, and who on account of her brightness, and her saucy engaging ways, qualities which are very rarely met with among the fair sex of the Indians, had been permitted to follow her husband. She had become everybody's pet. When I had got to the river, some "Schultsias," which were fringing the bank, attracted my attention, and in order to convince myself whether I had gathered them already I stopped a minute before getting ready for my jump, while KATE a little impatiently urged me on, laughing and saying that I must not detain everybody else for a little flower. Laughingly I took my start and jumped on to the boulder. I was just going to make the second jump when a heart-rending piercing scream from KATE stopped me and the Indian immediately following her, AWACAIPI, jumped the whole river uttering the frightened shout "Akuy, Akuy," (poisonous snake.) This happened the moment I turned round, for KATE was standing deathly pale on the boulder beside me and

pointing likewise to the bank we had just left, uttering the same cry: "Akuy." Greatly alarmed I asked her whether she had been bitten, when the poor girl broke into bitter tears and at the same instant I noticed some drops of blood trickling from her knee. Only a poisonous snake could have caused a similar wound and only the speediest help could save the life of our pet. Unfortunately, Mr. FRYER and my brother were the last, and the Indian carrying the medicine chest with the lancets the first in our long line. For want of a better bandage, I immediately unstrapped one of my braces and tied it as firmly as possible round her knee just above the wound, making the Indians suck out the latter at once. I believe the poor woman did not even know at first that she had been bitten, though the snake had twice darted for her, biting her once above and once below the broad bead-strings which she had twisted round her leg. Our commotion had called the attention of the others and among these also that of KATE'S husband, upon which they came hurrying on. Deeply moved as he was by the sight of his beloved wife, he yet managed to overcome his feelings, and throwing himself down by her side, began to suck her wounds. Meanwhile also my brother and Mr. FRYER as well as the Indian with the medicine chest had arrived. Mr. FRYER scarified the wounds, and, crouching upon their heels, the rest of the Indians to all appearance indifferently looked on, taking each of them their turn in sucking out the blood from the wounds. The circle of these unsympathetic faces with their bloody lips looked something ghastly. Though we instantaneously applied spirits of ammonia externally as well as internally all our

efforts proved useless;—at the end of three minutes the normal symptoms of poisoning appeared, the whole body was shaken with violent trembling; her face grew more and more livid and corpselike. Soon cold perspiration set in all over her body, the poor woman complained of violent pain all along the side of the bitten leg, in her back and about the heart, while the wound itself seemed to remain free from pain. She could no more freely move her foot; convulsive retching set in next, which soon turned to blood-vomiting; her eyes became bloodshot and blood flowed from her nose and ears. Her pulse beat 120 to 130 in a minute. At the end of eight minutes our darling could no more be recognised in this picture of human suffering. Already at the beginning of the blood-vomiting she had lost her speech. Meanwhile the snake which the Indians had found lying a few inches off the road had been killed by them. Perhaps in jumping from the bank to the boulder I had touched the animal, which then darted for poor KATE who followed close behind me, unless she had touched it herself. When the Indians found it, the snake had already coiled up in a spiral, its head lifted up and threatening a new attack, a sufficient refutation to the statement that they take to flight after each bite. It was a specimen of the highly dangerous Trigonocephalus atrox, which had just thrown off its skin, during which time all poisonous snakes are considered more dangerous than under ordinary circumstances. The Indians called it Sororaima. Fourteen Indians and Mr. GOODALL had already passed it by without noticing or without stepping on it. KATE became the victim. The unfortunate woman, already in a state of unconsciousness, was carried

in her hammock back to her village, which only in the morning she had left in such a gay and happy mood. Accompanied by Mr. FRYER and her husband, who still exerted all his fortitude of soul to hide his sorrow, the procession moved towards our village. The look which we had thrown upon the unconscious sufferer before she parted would be the last we knew.

In what kind of a mood we continued our journey, especially I who still considered myself the innocent cause of the accident, is better felt than said. A long time passed before any sound was to be heard from among our silent column. Even the Indians could not give room to any other thought but about what they had just lived to see.

Four Old Letters from Demerara.

THE writer of the following letters was WILLIAM PARKINSON, owner of Pln. *Grove*, Mahaica, and his correspondent in Boston, GARDINER GREENE, whose name is perpetuated in *Greenfield* in the same district. They were written at two very critical periods in the history of Demerara and are well worth preserving. We have to thank Mr. JOHN PARKINSON of Boston for the loan of the original letters :—

Dear GREENE,—I wrote you on the 14th August and sent duplicates ✠ different opportunities *via* Barbados.—Nothing very interesting has happened since, in our political way remaining much as you left us, we are looking out every Day for Colonel KINGSTON who is appointed our Governour.—We have vessels in plenty to take in Freight, but the inhabitants still as backward in shipping.—Little or any provisions have arrived here since you left Barbados, and begin to be very scarce, the Barbados Merchants make a fine Hand of it in draining their stores of the relicks of their old Goods, by the demand here, they also do very well by selling their worst worthless lazy Negroes, not above 300 New ones has been yet exported from there, owing to a scarcity, otherwise the great Prices would well induce them.—Produce remains as you left us, Sugar 3 st, Coffi, 4 st, Cotton 14 st, Rum 16 @ 18 st.—I have made another purchase of CLEMENT and RICHES of 50 or 60 Hhds. fish, which expect to turn out something handsome by, but am very sorry to tell you the poor *Betsey* loaded wh. 9 Hhds. of it, 4 Boxes Candles and about 750 (lbs.) Rope

was knocked in a 1,000 pieces on the Sugar Bank by our infernal stupid Negroes. I dispatched them away before one, last Tuesday afternoon w. sufficient Daylight to get over the Banks and went after them in C°. w^h. P. & B. When I got to the *Philadelphia* found they were not there; and soon after came the Gentlemen in ye canoe, w. an Acct. of their leaving ye Boat full of water.—The next morning before Daylight, Mr. BUCKLEY and JOHN HOOD, not calling me, went and found the stem and stern sticking in the Bank w^h. a few pieces plank and Floor Timbers to the Keil. They saved abt. 700 lbs. Rope, the Mast, Boom and Mainsail; have since found a Box Candles.—I shall endeavour to save the Keil, Stem and Stern, and get a new *Betsey* rebuilt a little wider and deeper.—Take the misfortune as easy as I do and it will not occasion a Grey Hair more among your sage locks.—I have some little Expectation of getting by the by a small nice Schooner of our friend WINTHUYSEN, and am offered by Mr. M. DALY, the loan of his boat awhile so hope not to suffer for want of a craft, besides am sure of BUCKLEY'S & ROGER'S, both which expect in to-day.—I wrote Messrs. LAWSON & FRASER the 15th ult°. acquainting them Mr. M. DALY told me he had shipd 20,000 lbs. Coffi ℔ Capt. TOURNAY and had wrote them twice to make Insurance on it and requested me to mention it again to them.—you'll find that there are shipd. in Capt. FORTUNE 28 Baggs Coffi for the £100 stg. desired, insured the 14th Augt., which I recd. of the Est. of PH. BROTHERSON, decd., and am taking up some Debts in Rum and Sugar to the Amount.—The Purchases I make afford a good profitt, the 7 st on the lb. Sugar and 2 st ℔ Gal. Rum.—I should not tell you myself but I

think I am more industrious than before your departure.—However be *(that)* as it may you may rely on my assiduity on every Occasion. Capt. THOMSON, who is to convoy Capt. FORTUNE, ye *Eagle* and other Vessels from here, has not given out when he will sail, but as we suppose it will be on very short Intelligence have therefore closed my Letters of this date to LANE, SON and FRASER, to go by them, and left them w^h^. Mr. J. B. as am going to Essequebo, but expect still to write further by them, as suppose they'll not be sailed before I return in a Day or two, *via* Barbados—under cover to to our Friend J. H. All our Friends here and in the other River are well in ye old way, our Worthy Friend, Mr. ROTH, died about 10 days agoe greatly regretted by his Family and acquaintances. I wish you the greatest Happiness, and believe me D^r^. GREENE, Yours,

WM. PARKINSON.

Rio Demerary, the 1st Octr., 1781.

(Copy *via* Barbades.)

Demerary, the 18th May 1795:

Dear GREENE,—It is possible you are now arrived and happy among your Friends in Boston, however a few Days more may bring about that desirable Point.—And you will be impatiently waiting, I make no doubt, to hear how your Friends are here, and know the Events that may have taken place.—We were after you left us all quiet, and in anxious Expectation of the arrival of the Dutch Commissioners that were spoke off, and we had afterwards official Dispatches to our Governour *via* Surinam that they certainly were dispatched over France, on the 3rd Inst. After those Dispatches, an English

sloop *(of)* war, the *Zebra*, appeared of here and immediately sent her Boat w^h^. an officer to ye River; after delivering to the Governour his dispatches the Court of Policy was immediately convok'd for the purpose of deliberating on them, which consisted in a Letter from the Commanders in Chief at Martinique, VAUGN and CALDWELL, to GROVESTYNS, informing him *(that)* in consequence of Directions from Ministry at home they sent to inform the Governour how that Troops were expected momently out and 600 would be sent over here for the purpose of taking over the Colony for the Prince of Orange, and to know where *(whether)* the(*y*) might be received.

The Court judiciously pay'd no attention to the Mission; there accompany'd the Dispatches a Letter from the Prince of Orange to the Governour requesting him to give over the Colony, when the English should send.— The Governour however in ye mean time, tho't it best to take himself off clandestinely on board the *Zebra* the 5 of May, and went off w^h^. her, sending letters from on board, by the return of the Pilot Boat he went off in, to the Court of Policy, that he found after his going on board the vessel, from urgent Buisness, He was under the Needcessity of going with her, and recommending the care and welfare of the Colony to them in his absence.

Ten days had only elapsed when the Burgers of of Stabroek began to make a stirr about the situation the colony was left in, and took on themselves by a pretty general Election to choose four Representatives, w^h^. a Secretary, and lay'd down certain points of consideration and imediately communicated them to the

Captains of the different Divisions, requesting their co-operating with them in a like Election for each Quarter, and the representatives to meet in Stabroek 8 days after that, for the purpose of taking in consideration what plan was requisite for the conducting the Business of the Colony. Those steps—laying aside some restless spirits—might have been a great deal owing to the tardiness of the Court of Policy, not stepping forth immediately, but as such self created Societys are mostly attended w^h. and cause evil minded People to be busy; who should at this time step forth a Candidate for the Government but HENNING the Cobler, *alias* Baron STRAP, and began to hold up Guillotines, the Lanthorn Posts to be without Exception ornamented as Gallows Posts; Conkling among the coloured people, &c.; he had got for his Secretary the little limping Fellow called STYLE, whom you may have seen w^h. VLUSHOUWN as clerk, and assisted by a Blacksmith and a Taylor; and God knows what might have been the End of it, if Mr. FILEEN (who was luckily chosen as one of ye Stabroek Representatives, w^h. OUCKAMA, Doctr. VAN DURA and DUHART) had not taken notice of the Frenzy of the Cobler, and immediately summoned a Dozen of his Militia, and took into custody the four culprits, and put them in the Guard House, and next day it was tho't proper to conduct them to the Fort, where they still are. It was high time for our Court of Policy now to do something and after a short session and opening Letters, some time past arrived, in case of the Death or Absence of our Governour, found in No. 1, A. BACKER to succeed, and No. 2 in case he A. B., was not here, the Government then to devolve to A. BEAUJON, which he refused accepting off;

they got however Ad. Int. Commandeur PLETTNER to take the seat; They thought it now best to convoke both Courts, which was the 12th Inst., the Kiesheers ye same Day met for the purpose of choosing two members for the Court of Policy in place of the Governor and Fiscal, as WOLF was deemed not fitt, BRETON and DE MELLET turn'd up (that necessary Policy). The Serious Buisness of the Cobler was now a chief object in view, a new Fiscal was requisite which office Mr. HEYLIGER was prevailed on to accept Ad. Int., so that he is now investigating that Plott. It was tho't best, and in order to undeceive the Stabroek Representatives, that the Burger Captains should call together all the Inhabitants in their different Quarters and they have unanimously in each approved of ye present form of Government without any Innovation, *tot tyd en wyl*; and I have the satisfaction to inform you that the time of my C.....p being at last expired I yesterday humbly lay'd my resignation at the feet of the Bench, as doth confrater GRAVESANDE (and he has sold your Joulter again after one ride), there is a new member chosen in place of BRETON but have not heard as yet who. So far for Politicks, and we are even till now longing for ye arrival of our natural Protectors, and it seems the unanimous wish that none others should come.—I have the pleasure of saying we are all pretty well at the Grove.—POLLY has been very Poorly, caused by what we had been some time dreading; she grows better as fast as can be expected. We have been lucky yet in having abundant opportunitys over from B'dos to take our C. *(Cotton)* away; 17 of yours went ye other Day and I expect to send 13 to morrow by the *Mary*, the prices have been favorable as

you will see by some Copys of Letters I have inclosed you, since sales at 2/, it is again dull no vessels being there now; it has bro't me into a disagreeable Predicament as I have now 62 there and going there, already ship'd, and fear C. and I. will not remitt I. HOWLAND a Bill for £260 to meet a Bill of mine on I. H., ye 18 April, fav. THOS. LONG for £320 3 10, 60 Days sight, which I suppose LONG took w^h^. him, he sailed last Thursday in *Cordelia* (?)—if you will drop a line for me to I. H. I will thank you—I have ordered P. and I, to send ye 2d, 3d, and 4th Bills here that I may forward.—THOMAS began to trim a few Days ago—and all goes on well at *Greenfield*—Mr. HUBBARD is now shipping from Saratoga for Boston.—DANIEL T. says you did not understand him as he only promised 5 more Bales, to make up 15—have not got ye 5 yet.—Our worthy Friend Mr. CAMPBELL was buryed on Friday.—Mr. BRO. has del'd over *Eliz. Hall* to the widdow, they are quite distant.—She has appointed I. HOPKINSON and Mr. HEYLIGER—Mr. B. stays now w^h^. Mr. JONES till his House is ready on ye *Pearl*—your old Neighbour PENDERGRASS has made his Exit, you are nominated, ye other Executors decline also—they are by ye will in that case to nominate other Executors.—Hatch picks slowly I believe he has not 20 Bs. ready, when they are shall send them on to you.—I will conclude wishing you and yours, with much good will every Blessing.—Our Dear Girls JANE and ANN I send my love to and hope they will be good Girls, also my Cousin BETSY PATTERSON, with best respects to Mr. HUBBARD and Family,—Dear GREENE: I am Ever yours,

W. PARKINSON.

Rio Demerary, 28 July, 1795.

GARDINER GREENE, Esq.,

Boston.

DEAR GREENE,—We are now expecting anxiously to hear from you, and may the welcome news soon reach us—my last was on ye 3d Inst., before that I wrote you of ye 18 May and 15 June, since which time it has been very unpleasant here, owing to the bush Negroes, who have been more troublesome and have been join'd by some delinquents from some Estates. Altho' it's very painful intelligence to give you, I think it best, as you will ere the receipt of this perhaps have very unfavourable accounts circulated; and indeed my feelings before this would not allow me to inform you by a New London vessel, which if this fails meeting it will be sent *via* Barbados. I think it was on the 4th Inst., about 9 at night—a Post of a few soldiers stationed at St. Felix's in ye canal was attacked, it was supposed by a number of above 100 of ye runaways, they were however obliged to fly w^h^. ye loss of two or three who were drop'd; the revolters discharged near 50 Shott it is said. You will say how is it possible for them to have armed themselves. DE MELLET bro't some Indians early next morning, and by scouring the Fields and contiguous Bush took up a few. Only a few nights after that poor I. CLARKE (of *Windsor Forest)* next to Mr. WATERTON'S *(La Jalousie)* fell a victim, with two or three other whites on the estate, and every Building on the Estate *(was)* burnt to the Ground. This however has been laid to the Driver of the next Estate, *Ruymzigt*, and a House Negroe of CLARKE'S own, who have been since, with others, executed. This caused the Post at the *Hague* to be

stronger man'd and another one to be established at *Waterton's* one at *Schuylenburch's*, *(Phœnix)* and others up the river; immediately on this a part of *Ruymzigt*, *Waller's*, and *Harlem* Negroes went off and an attack was made on ye post of a dozen men at *Schuylenburch's*, which fail'd w^h^. a loss on the side of ye runaways only. The same night they attempted burning KRAIN'S *(Nouvelle Flandres)* but were prevented by his own Negroes, *(they)* went to CLAY'S, *(L'Union)* which Negroes could not prevent their burning; there the dwelling house was saved; every Building on *Rotterdam* the same night was consumed, and an attempt at *Harlem* but miscarried. CLAY'S negroes remain trusty, but all *Rotterdam*, men, women and children, went off; this happened I think a week ago. It is supposed, as the whites were so much alarmed and left those Estates, that *(therefore)* those depredations and attempts have taken place, and the cause of *(the) Rotterdam* negroes going away *(was)* owing to a villain of a driver of *Harlem*, (who took off some of ye negroes) who told them they would all be put to death by the Indians, as no white Person was with them; this may not be so improbable as several of *(the) Rotterdam* negroes have come in since. No lives have been lost since *(the affair)*, at CLAKKE'S, except the poor Cockney soldier we knew at this Post, who was shott going between some of the Posts. You may well suppose how alarmed the Colony must be at this Crisis. Reinforcements of Indians were dayly expected; a few soldiers from Berbice have arrived, and Dispatches sent over land to Surinam for what assistance can be given from there. In this intermediate time I have not heard of any thing alarming

taken place, the different Posts not being yet active, expecting the Reinforcements, and waiting till the bush-water abates, the back dams as I hear being all ordered *(to be)* cut open on Saturday night. A few Prisoners or Hands are bro't in now and then, as rewards of 3 and 400*f (guilders)* is held for a Hand or alive; and dreadful executions took place on Saturday and Monday. The Court of Policy have given the command *(to)* KOPPIERS, who has Mr. McCRAGH w^h^. him to act on the river side and canaal, and Mr. DE MELLET on the sea coast, and has issued out a Publication a few Days ago for the Inhabitants to send one chosen negroe man to every fifty, who will go voluntarily to make up a Corps of 100 men, to remain permanent for the Colony, whom on their good Behaviour are to be freed; the Colony paying the value of the negroe, not to exceed *f*1,000. I have given two, who went willingly, and on the proposal at *Greenfield*, where I assembled them all, several offered, and AMSTERDAM and MARS were nominated and went with mine; I suppose by this the Corps is complete w^h^. uniforms made for them.

In the Quarter of Mr. TAPPIN, *(Mahaica)* many gentlemen offered their Personal Services, and to take about 10 chosen negroes each, in preference to sending one, which in that Quarter, I found, w^h^. small Estates, difficult to raise, being commissioned in TAPPIN'S absence by KOPPIERS. Those Gentlemen were all ready in Boats yesterday at the mouth of Mahika waiting an answer to a letter to KOPPIERS, to know if their services would be wanting. It came about noon from Mr. McCRAGH on behalf of KOPPIERS; he said that the plan of 100 chosen men was by the deliberate Resolution of

Councill, and must take place. He was very thankful for the Gentlemen's spirited offer of personal aid; and that any one might bring from one to three negroes as servants, to be armed and act in case of need; in consequence this assistance returned. I beleive there are several volunteers who will be ready to go as soon as Mr. TAPPIN returns from ye river; it is pleasing that the Gentlemen said their People were so ready and willing to go with them. I suppose a grand attack is soon meditated on, and I think cannot fail of success; the numbers cannot be so great, and their Ammunition must be spoil'd and expended as it has been found at ye attack at Mr. SCHUYLENBURCH'S they were obliged to fire w^h. clay balls.

Happy my friend ought you to think yourself, that is now with your dear Family in a Country of Peace and Quietness, and a wherewithall to make you comfortable. You may well judge of our Feelings at this critical time—they may be compared to the Thermometer, rais'd or depressed as the different reports reach us. I have to exert myself for my own part and put a good face on it. I have in view indeed removing my Family to Barbados so long, in fact, I should be happy they were there, but the appearance of removing them at the time I intended might have been attended w^h. bad consequences, and I feel at present easyer than I did, as the flame that threatened once to spread over that unhappy coast has stop'd I trust. The *Hague* negroes have been very true and faithfull, and promise to continue so.

We are all, thank God, in good Health, tho' low in spirits as I have said. God help you and yours, and our

Dear Girls *(to)* whom tell as good a story as you can,—
Believe me, yours most sincerely,

WM. PARKINSON.

Rio Demerary, the 17th Augt., 1795.

Dear GREENE,—I wrote you the 28th ulto., by a vessel going to New York, which if it reaches you will not convey the pleasantest Intelligence, as it painted our situation to have been a short time previous to ye date of it really dreadfull, and altho' then not relieved of anxiety still we were much easyer than before. The Bush Negroes I mentioned had burnt three Estates on the West Coast and had been joined by many fresh Deserters, particularly ye greatest part of *Rotterdam* Negroes, which Estate was one of those burnt, and some of *Harlem*, but since that time (say ye 21st ulto) they have not done any acts of violence. Three days after I wrote you, the different Partys of Indians, Volunteers and black Corps, entered the woods by the signal of the fire of Cannon from the Fort, in five or six different Divisions at half past five a.m. Some of the Partys came out the same day without success, that under Mr. KOPPIERS, which included the black Corps and some Volunteers, entered at ye *Hague* back Dam, and from a Diagonal course towards ye river and canal fell in in ye afternoon at 4 o'clock w^{h}. a Town *(of)* from Forty to 50 Houses, they found only 2 Negroes in them, one a woman who had died not long previous to their getting there, the other a man who had been wounded ; from what they could learn the Houses had been evacuated that morning ; they halted there for the night and left it next morning after destroying all the Buildings, they come out at St.

Felix's in ye canal in ye afternoon without meeting any thing further.—The other partys, the chief one under Mr. DE MELLET, did not meet with any thing, except a few Houses; from those circumstances the Banditti must have moved further towards Essequebo. It appears strange it being now ten Days since that Expedition was terminated that we cannot learn where the runaways are; there is a report that there came out a party lately at Jonas's into the Plantain Walk for Provisions, which is not improbable.—The black Corps I am told is at *Blankenburg*, and the other Posts no doubt will move down as Intelligence may be obtained of them, there will not be any considerable incursions again into ye woods till the water abates more, as it was very deep the last time, and the chief object will be to guard the back Dams in the mean time.

I am in hopes that this desperate crew will not be joined by any more, as the flame did not spread at ye time it was most violent, we have had no orders from home as yet to make any changes in *(the)* form of ye Government. I am told ye Court House doors are open at the Sessions. We have had so few American vessels here that it has not been in our Power to ship any of your C· *(Cotton)* since that by Capt. COLMAN, and the few who went having filled up with their own produce. I should certainly have preferred it by far, but it not being prudent to have kept so much on hand at such critical times as has been.

I think there has been sent 128 Bales C. to C. and J., who have ship'd 20 By ye *Zephyr* and do not say your Quota *(was)* sold, as they had agreed for a large parcell, but not del'd, as there are vessels eno' now to take in for

America you may expect getting the remainder of your crops that way; the crop is now finished ginning at G. *(Grove)* and Twenty odd Bales on hand.—At Saratoga picking has not been able to go on so well on account of his Grass, I suppose there may be 40 to 50 Bales more to expect from there, tho' not 20 of them yet ginned off.

We were rejoiced two Days ago to receive all your Letters by Capt. BOSSON, tho' a letter of Mr. HOWLANDS to me that had been a week past in ye river might have announced previous to your's the Happy Tidings of your safe arrival. We feel glad indeed and pleased that you have not had occasion to say our Dear Girls badly bore ye chills,—The pleasure of seeing Mrs. GREENE w^h^. you here would be a great comfort indeed, but we rather despair of that agreeable Event now.—But Flatter ourselves w^h^. ye pleasure of seeing yourself before winter.—I think you ought to chose some pleasant place to the southward in America for your durable residence, as there is a doubt if ever this colony will become an Eligable situation for Ladies.—I am determined for my own part to remove with mine next year. We have a very pleasing prospect of another Crop and God grant that we may reap it off in Peace and Quietness.—Should you go to New York, ask Mr. VAN DEN HEUVEL if he has sold my 4 bales Cotton and remitted Mr. BUCKLEY, if not, request him to remitt only £850 and pay you ye rest—ye bales weighed 360, 295, 360, 360—heavy bales. Assure your good Lady of my high Esteem and Friendship, tell my Dear JANE and ANN I send them love and beg them to be good girls, my best regards to Mr. HUBBARD and Family, my Cousin BETSY give My Love

and tell her to write her cousin Polly—My dear Friend believe me,—Sincerely yours,

W. PARKINSON.

*The Crown Lands of British Guiana.**

By John Dalgleish Paterson.

MY experience of the wood-cutting industry has been acquired on the Demerara River, hence what I may write herein should be taken as strictly applicable only to that district.

Reducing the price of Crown Lands from $1 to 25 cts. per acre is most commendable, as much of the land for cultivation would even be very dear at that small price. It might be as well to lump all the fees and stamps, &c. connected with the purchase of such land in one, and fix the price at so much per acre inclusive of everything; the scale per acre being constructed from the existing fees, stamps, &c., about to be used, as recommended by the Crown Surveyor; thus in buying 350 acres, and using existing fees &c., the price per acre would be $1 34. This way of putting the price of Crown Lands is far more comprehensive than $1 per acre with a long string of fees, stamps, &c. attachable to the bargain. In the way I suggest a man would know at once that instead of a $1 an acre he has to pay $1 34, which is a matter of paramount importance to the class of working man likely to put his savings in such an investment. With regard to the 5 cts. per acre tax on uncultivated land, I am of opinion that if the land is worth cultivating profitably, it will

* The following paper has been handed to us by the Chairman of the Select Committee on the Crown Lands' Regulations, by consent of the writer, and refers to the report of that Committee dated September 6th, 1894.

not require a stimulant, and if it is not worth cultivating profitably, then the owner would be taxed for the privilege of owning land for which he has already paid the Government too much. A crucial point would lie in what the Government might call "beneficial" occupation and what the owner might consider the "beneficial" occupation to be to him. Perhaps the fewer strings left in the hands of the Government in purchases of Crown Land, the better alike for the Government, the land, and the purchaser. Your suggestions about the sale by Auction of Crown Land, are in my opinion exactly what is wanted. It is hard on a man after he has been to the trouble and expense of locating a spot, to have another man bid against him ; one who had perhaps never thought of using the land before for the purpose that the locator has had in view all along.

I cannot honestly say that "It is manifest *to me* that all progress in the settlement of British Guiana is retarded by the quantities of land that are held in the Dead Hand in the more accessible parts of the Colony." If the lands were worth anything to the "living hand" I have not the slightest doubt that the "dead hand" would rent or sell to the "living hand," or more probably do himself what he expected the "living hand" was going to do with the lands to his (the "dead hand's") own profit. [The writer will be glad to do a little business with any gentleman of the Hon'ble. Committee in this line]. What does to some extent obstruct transactions in these private lands is the want of proper transports, I use the words to "some extent" because there is plenty of land that has been bought and sold and rented &c., without any transport

furthermore, I think there are *ways* and *means* of obtaining a Letter of Decree from a Judge in the matter through the medium of a promissory note, a sale at Auction, and a Lawyer. To all practical intents and purposes, in most cases, this Letter of Decree is as good as a transport.

To make a long and expansive story short, in this matter, let the Government give transports for all lands that have been undisputedly claimed for the last 5 years and charge the recipients with the cost of making such transports. In the first instance the land must belong to somebody if you want the colony to progress; I don't suppose you are going to make a gigantic "public works" of the Colony; therefore as your first progressive step let the land be properly and individually owned. All the people I may say who claim lands are either themselves old settlers or the descendants of old settlers, and from that fact I would deem they had a better right to the land than any one else, and should be the first to benefit by the profitable use of it.

Referring to licences of occupancy, such a case as the following may occur—a man may want a piece of land for his residence and such land might be unprofitable for cultivation, this might be the case with a wood-cutter or ballata collector; it is necessary that his house be near the highway, *i.e.* river or creek. Is it fair then that the licencee of such land, at great expense to himself, should be compelled to keep 6 acres of barren land in cultivation, or do without that which would otherwise be a very valuable piece of land in the general conducting of his business? Would this come under the head of "beneficial occupancy"? I would also advise the adoption of the inclusive system of charging per acre for licences

of this kind. I would also urge that a definition be given to the term "beneficial occupancy" when used by the Crown Lands Department in licensing and conveyance of land. As it stands now the term bids fair to be a most formidable weapon in the hands of the Government diplomatist for use against the purchaser of Crown Lands from the Government.

When licensing grants for wood-cutting purposes, I think the power of making the grant should be vested in the Governor to deal with as he may think fit both as regards the welfares of grantee and the colony.

"It does not appear that there has been a single instance where it has been found expedient to put up any such licenses to competition;" as a matter of fact there might, and would have been, had the grant-holders been men of a different stamp to what they are. Now for instance, A. takes out a grant in a creek and spends a matter of $1,000 or so in clearing, digging, and stop-offs and, otherwise making the creek navigable. This A. does on the assumption that if one grant does not recoup his outlay, another or 2nd may, but before A. can see his way financially to do so, B. steps in and takes out the grant, A. has had in prospect, and makes use of A's invested capital, in the navigable creek, to get his (B's) timber out cheaply, and in so doing generates a good deal of friction about the use of stop-offs, landings, &c., between himself and A. So I think this well worthy of your attention

"Laying out a grant in such manner as shall best. enclose the trees" is most beneficial to the wood-cutter, and has in my opinion effectually stopped much illegal wood-cutting—the temptation was great and the manipulation very easy!!

About a fair average area for a wood-cutting grant on the Demerara river is in my estimation between 250 and 300 acres. There is not the slightest necessity for subletting, and if there were I could not recommend the system as it would lead to complications all round.

I do not think that as a rule, Aboriginal, or East Indians are ever fully *paid in money*; the question is rather, are they ever fully paid in any equivalent of money. This subject is of vital importance; there is the ordinance and a just and right one, but it might as well not occupy space in the law books, for it is worse than useless as it leads *the uninitiated* to believe that there is *really none*. Spirituous liquor in payment of wages is just exactly like the preceding subject I have dealt with. What I ask becomes of all the liquor taken up to these grants? It is no hidden fact that part of a man's rations on a charcoal grant consists of rum, that is, the rations being part of his actual pay, the labourer is partly paid in rum. The two clauses in the existing regulations, just alluded to, require re-construction of such a nature as to render them applicable to the morally and physically good purpose for which they were intended. We want something that cannot be slipped round—something grasping—something with no holes in it, then things will be healthier for both master and servant.

A great deal could be said in favour of imposing a restriction on the size of Greenheart and Bullet trees cut on Crown Lands, and just as much against it. When looked at from all points of view, however, it is a toss up which is the better course to pursue—I would give the wood-cutter, and the public generally, the benefit of the doubt by having no restriction at all.

A curious anomaly exists in the regulation about hardwood; the regulation says that "no other hardwood shall be cut than that will square less than 6 in." Very well; in the Crown Surveyor's statistics of produce from Crown Lands I find 5,000 beams and 64,000 spars stated as having come off Crown Lands. Now beams and spars are round pieces of hardwood with the bark on them, 20 to 22 ft. long by 3 in. (spar) and 5 in. (beam) in mean diameter, both being the product of the stems of young hardwood trees that would not square 6 in. or anything like it. It might also be well for you to find out if all the cordwood mentioned in the table was the product of hardwood trees as defined by the ordinance as lawful to cut. I direct your attention to this as I think it extraordinary that any person should in the first place take out a grant of Crown Lands for cordwood-cutting and secondly if he did, would be so honest as only to cut the soft wood trees he might find on it; I mean of course under the specified restrictions. All the provisions of the '90 Ordinance controlling the removal, conveyance and sale of timber, are remarkable good and quite easily worked.

The right to make paths through unoccupied Crown Land should be included in the right to cut timber &c. on the grant; nobody takes out a grant to cut timber, and lets it remain on the grant, why then this absurdity about privilege in making a path to remove your produce. The privileged occupation of 5 acres is nearly always a necessity and must not be confounded with my previous remarks about wood-cutters' licenced grants of occupancy.

The royalty payable in the wood-cutting industry, as fixed in the Schedule of the 1890 Ordinance, is not calcu-

lated in my opinion to injure the trade in one way or another, or to oppress or injure the licenced wood-cutter. The people who really have to pay this royalty are the owners of constructions in timber, &c., that have been made since 1890, and also the consumers of charcoal and other products of the bush. Greenheart, wallaba, mora, charcoal, cordwood, &c., are only used for purposes that no other wood or articles can be imported to profitably serve; hence these woods and articles are bound to be used whether the tax of royalty be on them or not. If the wood-cutter does not see this and pays the royalty for the consumer then he has himself to blame for his want of foresight and should "stand easy" and try on the first opportunity to make the consumer pay. I look upon the royalty as making no more difference to the licenced wood-cutter and timber merchant than does the duty on rum to an estate or a rumshop keeper; moreover the royalty is nothing very great when done; even if the wood-cutter had to pay it actually himself! It often occurs to me that the casual observer of the industry ignores the following curious fact relating to the subject, that is, that in certain constructions, were colony wood selling at the same price as imported wood, it would be cheaper in making a construction to pay a cent or two more for imported wood as it would answer the purpose better with an expenditure of less labour on the job; particularly so would this be the case with anything requiring lightness combined with the capability of resisting the action of the natural elements.

One dollar per acre of security is far too little for a grant to cut wood; the higher this bond is the fewer the

people engaged in the business and the better the chances for their making a living at it, and paying their way honourably. This is just where about 80 o/o of the trouble you are deliberating on really lies; it is far too easy for any man, whether he is competent either financially, expertly, or educationally, to take out a grant. At present the trade is in the hands of men who use other people's money to carry it on, consequently the market is glutted and heavy loss ensues to those who have advanced the incompetent grant-holder; this, coupled with the abandoning of sugar estates and general depression in trade all over the colony, (greatly due to gold), is I think responsible for the present state of the wood-cutting industry. Eighty per cent of the wood cut on the Demerara river is used up in the colony and the islands. In Essequebo this is quite the reverse, but trade there has had to meet bad markets in England and the Continent, bnt I have never heard much crying out from the Essequebo people in the business. Essequebo, I may say carries on all the export trade, the greenheart logs in that locality being squared for, and naturally suited to the requirements of the export trade. My firm are about the only export shippers of greenheart from the Demerara River and we find that in order to be able to sell our timber in England, we have to select and resquare our logs after buying them from grant-holders; only about 80 o/o of the ordinary Demerara river logs can be thus prepared by us for profitable export.

We don't run our own grants because it would be injudicious to do so as long as there are other people quite willing to do so and sell us the timber at a loss to themselves We always try to make our undertakings

pay and as a rule succeed, or leave it alone for some one else to undertake and to lose the money on; this is how we have conducted business in this line for 80 years, and have always been able to pay 100 cents to the dollar. No one grant-holder on the Demerara river could load you a ship.

Four or five men in Essequebo produce more than half of the timber taken from Crown Lands in the colony annually and any one of these men could load you a vessel with timber off his grant in 35 days. These are the men who do the most work in the trade and have least to say on the royalty matter. From the table of statistics in your report I cannot tell how many grants were in the Demerara river or what they produced in anything, neither is it possible to say whether the grants were used for greenheart, shingles, charcoal or anything else, but I think I shall be safe in making a few assertions about them, the accuracy of which can easily be proved by the Crown Surveyor. In 1893–4 there were about 22 grants for cutting greenheart in existence, and about 20 grantholders, and I think that the average output per grantholder for the year would be about (certainly not more) 6,500 c. feet. Some of the grantholders did not, I am sure, ship individually more than 3,000 feet. I think possibly about 15,000 feet would be the largest individual shipment for the whole year. Licenced grantholders do not cut Mora, Wallaba and other woods, into the shape of timber for mercantile purposes: these kind of woods are all cut by jobbers off private lands, either their own or obtained from some one else. This kind of timber is sold at about a quarter of what its real value ought to be,

that is if the labour expended in its production was taken into account at its present market value. A good deal of the work done on grants (Licenced) is performed "Buck fashion," a most unbusinesslike, unmethodical, and unsatisfactory kind of labour swapping system. No grantholder that I have ever come across, with one exception, could ever give me any comprehensive idea, supported by data derived from former experience, of what he was about to do, had done or was at present doing; they all seem to be totally devoid of any calculating power; their ideas of space, time and quantity being summed up in the well worn and edifying phrases of not too far, not too long, (in the latter a period of time is inferred) and a heavy bush, or a mass of greenheart.

All the grantholders on the river are in debt, with perhaps one or two exceptions at most. Some are more heavily in debt than others, but it matters little to them whether the debt be large or small, as they never had any money when they started, nor do any of them possess realizable property sufficiently valuable to be worth a creditor's trouble and expense to take away. I pity some from the bottom of my heart, a few who really deserve it. Generally, the chief aim on taking out a grant, is to make a living off the provisions and advances obtained from people who are foolish enough to believe all that is told them and to keep the grant running as long as deception can be made to manage it. If the grantholder is a smart fellow, he can generally make his grant run three fools at a time. The fools usually consist of his labourers and two merchants in town, preferably Portuguese, or still better one merchant in town, and the other PATERSON

at Christianburgh, the latter selection of dupes is found to work easier and gives less trouble with better results. The term usually applied to this method of business is "Flooring" and it is looked upon as praiseworthy and indicative of genuine aptitude for the healthy conduct of the wood-cutting *profession;* it is more or less neatly done according to the mental development of the operator. All wood-cutters who have any pretentions to doing good business are married; the wife being found extremely useful for transacting some of the more delicate parts of the business in which it might not be prudent for the husband to engage. I have written on the foregoing points as I have solidly experienced them and also with the grim satisfaction of seeing a well merited end fast approaching to such a deplorable state of affairs.

The labour system on wood-cutting grants is rotten *in toto.* On a grant of say 300 acres in the Demerara river, there is not more than an average of 10 men employed, and they work in such a desultory way that it is only for a few days when hauling is going on that anything like an approach to the complement of men necessary for profitable work is employed. The accompanying estimate of days labour on a 300 acre grant yielding 20,000 cubic ft. will show you that a clean sweep of the grant could be made in about 212 working days with 40 men—the number I would deem absolutely necessary for profitably working such a grant. I have carefully prepared this table for you from practical data which I have collected from time to time, as opportunity offered it.

Three years it will then be admitted is ample time for any man who is really working, to clear a 300 acre

grant. In handling greenheart the quicker it is done when started, the less the cost, which implies the command of capital and is just one of the desideratums, disqualifying the men for the work who are at present engaged in it. There is a want of that confidence between the master and servant which is all important to harmony in work. The labourer is rarely if ever paid in full on the expiration of his contract; experience has taught him to expect this, consequently he is always on the alert to "floor" his master whilst working. The labourer also knows that when his master "floors" him it is a waste of money, if he has it to spend, and time, to legally sue for what the master has not in his posession. Furthermore, the labourer comes on the grant and goes away when it suits his convenience regardless of the terms of his contract, and whilst on the grant does his work in such quantity and of such quality as he thinks fit. Discipline is unknown to the servant, and the master cannot enforce it; the law is then of no practical use, it is too expensive to use owing to the time and money lost in traversing the distance to and from Court and the long intervals between Courts &c. The truck system is universally used by grantholders in their transactions with their men, so that really the prices quoted in your report are fictitious and form no adequate measure of what the man makes per day. You want to get at the purchasing power of the dollar before any real and true estimate of the man's wage can be made. I think this pernicious system ought to be abolished by law. There should be no need for a man to buy anything from his master whilst working for him, but if at any time such need did arise, let the necessary article be

supplied to the man at fixed rates by law and a true record kept of the transaction, subject to periodical inspection and on occasion of request by any Government officer.

The institution of sworn measurers would be no end of a humbug. The callipers is the measure in use in all timber transactions on the Demerara river.

The string is only used on the Essequebo and in England. I use both callipers and string in loading ships for England and consequently ought to know the relation between the two systems. I use Liverpool style not London. The 1890 regulation stipulates that string measure be used in paying royalty. String measure is always less than calliper, the difference between them being a measure of the quality of the squaring, more so in large than in small logs. The difference between string and calliper in Demerara river varies from about 14 to 20 o/o. It is impossible for the Crown Land Officer to measure by string owing to the manner in which timber is delivered, therefore with the knowledge and sanction of his chief he measures by calliper and deducts 10 o/o only to turn his measure into string. It is penny wise and pound foolish for any dealer to employ a common porter to measure timber. My driver, who does that work, is an expert at it, and usually does it with a gang of 4 men, and it requires all his acumen to pick out plugs and sundry other little pieces of inlaid work calculated to defraud the buyer. I have never cut off anything but actually bad timber and that is done in the presence of the seller or his representative by the driver if it is anything usual; if unusual he consults me as to how much he should cut off. As a rule the

seller and I arrange to our mutual satisfaction; I like a fair and just transaction and generally make it without much trouble. Let us take an example of what is done at present in measuring, and what would be done in future by the proposed style; say the load = 300 cubic ft. after it has been measured by calliper in the usual way and the usual cut off has been made in doing so, then old style by calliper and 10 o/o allowance for string on royalty would give

300 cubic ft. @	24 cts. ...	$72 00
270 cubic ft. @	1½ cts. ...	4 05
		$67 95

New style by string (actual) and no allowance, but actual string used by Crown Lands' Department Officer, would give

240 cubic ft. @	24 cts. ...	$57 60
240 cubic ft. @	1½ cts. ...	3 60 and New rate of 1 cent not used.
		$54 00

If this is what Mr. FORSYTH calls better for himself and better for the Government, I would like to have a few transactions with him under his new suggestion. The third matter, to which Mr. FORSYTH directs your attention, ought not to exist at all with a man doing good round business, but from what I have already told you about grantholders you won't wonder at it; to me the marvel is the exceedingly small rate (only 5 o/o) for which the risk of security is taken. If you really want to give the Government a shadow, in lieu of a reality, I can confidently recommend you to use the grantholder's own personal security to obtain the requisite result.

Dogs and guns are not necessary on grants, and are

usually a great deterrent to steady reliable work. I should advise the cultivation of the fine art of legislation in the renewal of grants even to the perfection of fining the security (the wood cutter would be no use) if any timber were left on a grant on its expiration, because that would indicate that the grant had not been properly worked, and means a loss to the Crown Lands Department and the colony at large. I do not think a labourer can be legally compelled to pay his own registration fee, but I don't see that there would be any particular hardship to him if he had to do so, as his only contribution to the Colony chest is at present through the medium of the rum and tobacco he uses.

The cultivation of charcoal grants as suggested by the Crown Lands Department would increase the cost of producing charcoal, for whatever was cultivated would cost more to grow than it would fetch in the market. The idea is theoretically good but not practically good in dollars and cents. If the Government have the money and are willing to spend it in this way the writer is of opinion that the most suitable and least expensive thing to cultivate on such tracts is the casuarina tree. I formed the opinion from a small practical experiment, tried with the tree named, on such a place. The annihilation of vegetation on charcoal grants *is not complete:* this is just where the expense in the rearing of the casuarina would come in, all sorts of rank "Minab" bush immediately grows up, and if not cut down would kill the casuarina. I have seen this happen. Regarding Mr. IM THURN'S letter I may say that this certainly would at first sight appear to be a move in the right direction, and it did so occur to me years ago, but the

fact is that it does not pay a licenced woodcutter who has his path cut and his men on the spot to cut one of these cedar and other trees. I have often talked with woodcutters on the subject as suggested to me, on seeing the trees standing in their paths. Much less then would it pay a man to make a speciality of the job and construct the same path for one or two trees as would do for 100 trees, use the same gang, in fact incur all the heavier expenses of a woodcutter, for one or two trees scattered over a very large area. If the proposed ordinance were put in force a large portion of the present scarce wood-cutting labour would be diverted into an unprofitable channel; because it is notorious that when a wood-cutting labourer, whether negro, Indian, or mixed breed, goes to work for himself he values his labour at *nothing;* but when the same man goes to work on a grant for a wood-cutter he values his labour at *something;* of course the grantholder and he have different ideas about the value of that *something,* yet nevertheless the labourer would make more off the wood-cutter than he would do by putting in wood-cutting on his own account as you would encourage him to do by the ordinance. Seeing that quite enough of this exists already, I would say leave the existing ordinance alone. Some kind of double purchase regulation should be enforced to preserve the Bullet-tree, as the "piece work" or "job work" system employed in collecting ballata lends itself to the reckless destruction of trees. I fully agree with Government Officer SUTHERLAND in his remarks on the Demerara river.

I have never bought any timber from Indians, or rather so-called Indians, since 1890, as the regulations of that

year distinctly forbid any timber dealer so to do, save for his own personal use. The Government have helped other merchants to break this ordinance in town. There is no depôt for the sale, by a Government Officer, of such timber on the Demerara river or at Christianburgh. My business at this place has been affected by the sale of Indian timber exclusively in town as can be surmised from the above statements; so long as so-called Indians are allowed to cut and sell timber in the open market even if royalty be imposed, just so long will they continue to be a millstone about the neck of the licenced woodcutter; at the present moment the reputed Indians bid fair to produce more than half of all the timber that will be cut in the year 1894-5 on the Demerara river. The only sure cure for the evil is very drastic, but must be used if the woodcutter is to live, and that is to stop the Indians by repute cutting timber altogether. The long tailed variety or "real Indian" does not cut timber because so doing does not coincide with his natural habits of life. Every word that the Crown Surveyor, Mr. FORSYTH, and Mr. DA GRACIA have told you about the unfortunate Indian, is, I sincerely deplore and regret to say only too true, I could bear out fully from personal experience every statement made by these three gentlemen. The relatives, other than Indian, of some reputed Indians, make use of their Indian relative as a fence behind which to carry on a little illegal timber business; as a matter of fact this would be exceedingly difficult to prove at law. Before I am burst up by Indians I think it might be well for me to find an Indian relative and open negotiations with him. I don't think it would be difficult to do this!!! as I see my name flourishing about in

your report showing clearly that the Indian has carried the enterprising spirit connected with the name into timber trade along with the name.

Drunkenness is natural in an Indian. Nature on the other hand guards him against the evil with the unwritten law, Thou shalt grow thine own cassava before drinking thy grog. We step in and interfere with this arrangement between the Indian and his Creator by making it easy for him to get liquor without its attendant impediment of labour extended through time; with the consequent result of a drunken Indian for a few years or days and then no Indian at all. This crying evil daily calls for some compound triple expansion surface and otherwise condensing ordinance, to deal with it, and the sooner you get under-way with the construction of this powerful engine the better, alike for your own repute as a moral nation and your own souls in the hereafter. I have heard you pray in your Honourable Court for guidance in moral matters, I beg of you therefore not to neglect the golden opportunity before you in the Indians. The real "Raw Buck" as he is called commonly, is gradually becoming scarcer and scarcer; some say civilization and rum is killing him. I hold he is dying by rum, civilization, natural death, and absorption into other races by intermarriage; possibly the last has more to do with the Indian's demise than ordinary people who don't come much in contact with Indians would be apt to think.

I simply look upon the obliteration of the Indian as inevitable, in short, a realization of DARWIN'S theory of the survival of the fittest. At the same time I think it would be well to preserve a few Indians by reservation,

&c. as is done in America, just as a curiosity for future generations. The Indian as I have always found him, in his natural state far away from the striving world of civilization, is a peaceful, often dirty but altogether natural looking man, he is most hospitable to the stranger, naturally good in morals, tractable in his own groove of life, and in every way a man calculated to be worth the study and comparison of a civilized man alongside of himself. He is truly nature's own child and we have to remember that the soil he is on belongs to him when we deal with him.

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300 ACRE GRANT = 20,000 CUBIC FT. = 500 LOGS AT AVERAGE of 40 FT. PER LOG = $66\frac{2}{3}$ CUBIC FT. PER ACRE = $1\frac{2}{3}$ LOGS PER ACRE.

Day's Labour of one Man.

	Days.
Erecting Building	200
Squaring 20,000 cubic ft. at 50 cubic ft. per day ...	400
Path making for 3 miles of timber path, or 1,320 roods, at $4\frac{1}{2}$ roods per day	$293\frac{1}{3}$
Allowance made of same in day's labour for moderate bridging	100
Canting, Slewing and Jawing, 500 logs at 8 logs per day	$62\frac{1}{2}$
Boring 2 holes in each log, 500 logs at 50 logs per day	10
Sniping 500 logs at 20 logs per day...	25
per day...	6,000
Hauling 20,000 cubic ft. over a 3 mile path at 3·3 cubic ft.	
Clearing the creek and making stop-offs = say ...	1,000
Transporting 2,000 cubic ft. down a long creek to river at 25 cubic ft. per day	800
Making 80 bush rope punt slings at 1 sling per day ...	80
Making 40 water beams at 1 beam per day	40
Loading 20,000 cubic ft. at 150 cubic ft. per day ...	$133\frac{1}{3}$
Taking 20,000 cubic ft. in punts to town ; discharging and returning at 50 days per 1,000 cubic ft.	1,000
Miscellaneous days labour...	356
20,000 cubic ft. to put in town = days labour... ...	10,500

10,500 days labour at 72 cts. per day	...	...$	7,560 00
20,000 cubic ft. delivered in town costs	...	...	7,560 00
20,000 cubic ft. at 37·8 cts.	...	...	7,560 00

40 men in 212 days would thus clear the whole grant of 20,000 cubic ft. and deliver it in town.

The Future Prosperity of the Colony.

By Harry I. Perkins, F.R.G.S.

AT the present time, when the state of the Sugar Industry is in so unfortunate a condition, and men talk with bated breath of the impending financial difficulties, consequent on a long continuation of the depression which threatens to destroy the prosperity of the colony indefinitely, it is surely the duty of all to whom the colony furnishes a home,—and a far from unpleasant home too,—to use their best efforts, by active combination, to stave off the evil days which seem so unpleasantly near; and by cordial co-operation with the Government and each other, to make what appears to be a calamity, into the turning point of the Colonial fortunes.

In the first place, an alternative to the Sugar Industry —the mainstay of the Colony—must be sought for, and its merits examined.

The most obvious alternative lies in the Gold Industry, which, after an almost uninterruptedly successful and rapidly increasing growth, has this year for the first time failed to add to its already considerable proportions. There are several causes of this arrested development, some of which were already in existence when the Industry first started, and others which have "grown with its growth." It is impossible to overcome them all; but much may, and can be done, to lessen their influence in such a degree, that the progress of the Industry and Colonial prosperity generally may not be unduly retarded.

First and most important of all, is the difficulty and tediousness of the existing state of communication between the settled parts of the Colony and the diggings. To this is due in a great measure another cause, the general ignorance that prevails, from amongst the highest to the lowest classes, but chiefly amongst the former, of the conditions of, and the circumstances attendant on, a life in the bush. In consequence of this ignorance, the general idea is that the bush is a dreadful region, full of alarms of fever, and the haunt of Death in many and varied forms. A further cause, due to inadequate means of communication, is the high price of labour at the fields, for it is, or used to be regarded as mildly heroic to venture on a life at the diggings; to face the falls in the various rivers and the death-dealing (?) climate of the forest-clad country, where, up to the present the gold has been found. The same may be said as regards the employment of the horde of rascals who have from time to time been deputed to manage the affairs of those too timid to face the forest life, and who have been content to continue to labour at a small wage in the civilised districts, whereas by a bush life they might have had the conduct of their own affairs at a much higher rate of remuneration, receiving at the same time the satisfaction of eye-witnesses that their affairs were carried on in such a manner as they themselves could approve.

The extremely unsatisfactory condition of the labour market is one of the chief disabilities under which the Industry at present suffers. It is due in a great measure, to the natural disposition of the labourers themselves, who, though as a rule possessed of great

physical strength and powers of endurance, are incapable of sustained effort for long periods. Many of them are absolute malingerers, and not having the virtue of thrift, generally dissipate their earnings, which in some cases are large, after their return to town, or to their native villages. Quite as much at fault, however, are those who employ them and rob them of the wages for which they have worked; and taking both sides of the question, that of the inefficient and unwilling labourer on the one hand and the dishonest employer on the other, the balance appears to be equal. As in other human affairs the good and bad suffer alike, and one party pays for the delinquencies of the other. This is a state of matters which all can and should assist to improve. Several Companies and individuals do take care to secure reliable hands and to induce them to return to the same employment, after each period of service followed by its period of rest has expired. The concentration of the registration and engagement of labourers, by having one single agency in each district, will tend greatly to ameliorate matters and afford protection both to the labourer and employer. It seems scarcely to be a subject which can legitimately engage the attention of the Executive, but to be more within the province of the public itself, which can by a consensus of opinion establish its own medium of registration and engagement of labour in addition to the registration exacted by the Government. It has already been pointed out that if the labouring classes only realised their power, were thrifty, and had the faculty of working in combination under the leadership of one of themselves, they would rapidly acquire not only most of the wealth

of, but actually the leading positions in the community of which they form part, and where this class can help towards the attainment of the common good is in striving to be more self-reliant and in cultivating habits of thrift and economy. For the dishonest employers the only measure required seems to be the amendment of the penal code in order to meet with and discourage the repetition of such offences as they are guilty of, and which tend to make an already bad labour supply still worse.

The depression in sugar and the abandonment of various sugar estates may set free a supply of labourers, who have not as yet attempted the bush as the sphere in which to earn their livelihood. If this should be the case, and it is by no means unlikely that it will be, it is to be hoped that the new labour, skilled as it must be in greater or less degree, in the main requirements in the labour line at the diggings, viz. good cutlass, axe and shovel men, may meet with a fuller measure of fair dealing than those who preceded them have done, and that the relations of employers and employed, may in consequence be strengthened and improved to the advantage of both parties. Here again the establishment of a single registering agency would meet the case, as has been testified to by witnesses before the Commission appointed to enquire into the state of the Gold Industry and easy acquirement of Crown Lands.

Amongst the most, if not the most destructive causes of the prosperity of the Industry in its existing shape, is the wholesale theft of gold from placers, which is carried on in spite of all the precautions for searching and supervision that have been taken to stop it. Most of it is done by dishonest foremen in charge of the toms

and sluices, who subtract a small portion of the daily output as it is made, and dispose of it either to professional thieves and illicit gold buyers in the bush, or else in rare cases risk the chances of detection, and sell it in Georgetown or at other centres. It would perhaps be a source of annoyance and loss of time to make each parcel of gold pass through the hands of the Government Officer resident in each district. He, on account of his local knowledge would have the most reasonable and just grounds to act on any suspicions of unlawful dealing, with regard to any parcel of gold, the circumstances attendant on the winning of which, might not satisfy him, and to seize it; but in the absence of detectives and police, and of skilfully laid traps to secure the detection and punishment of offenders, there does not seem to be any more reasonable and expeditious manner of dealing at once, as things are now, with the matter. Here again improved communications are the key to a large part of the situation, for if people will look after their own affairs they will stand less chance of being robbed. Widely extended supervision will tend to check a great deal of the evil which flourishes owing to bogus placers being located for the real purpose of passing through the registers of the placers, in judiciously distributed portions, the various parcels of gold bought from thieves working on *bona fide* rich claims in their vicinity.

A very important point remains to be enumerated and one which though it seems to have been but seldom mentioned, has nevertheless exerted a strongly depressing influence on the Industry,—the point is this—that there has been a widespread opinion in spite of the hard facts

of statistics to the contrary, that there is no stability in the Industry, and that though apparently flourishing now, and the source of wealth to a few, it must in a short time entirely cease, or if not actually cease, be reduced to such insignificant proportions, that it will scarcely be worthy of a place amongst the important products and exports of the colony. It seems almost a work of supererogation to show how fatal to any Industry or business, such an idea must necessarily be, and more particularly so when the idea is entertained by the very persons who have most to gain by an exactly opposite state of affairs and of mind. How can any confidence arise and remain in the minds of those whose capital is so urgently desired here; (and by capital is meant not only the capital counted by the current coin of the realm; but also by a far higher and more useful standard of importance, the capital of brain power, of strong willing arms, and of clever skilful fingers), if we have no confidence in our own country? There is need not only of the rich investor with his money; but also of the highly trained intellect of the mining engineer and the metallurgist, and the precision of the skilled artisan. Stated briefly if we do not believe in ourselves how can we expect others to believe in us; and further if we do not help ourselves, how and where is the required aid to come from?

The possibilities before this colony are practically limitless, due chiefly to the striking natural features it possesses. It will be enough to mention them briefly and in rapid succession. Take first the long stretch of fertile coast land, easily drained and within no great distance of suitable markets for its produce throughout the

West Indies and North America. Next, the equally fertile soil of the river mouths and for short distances up their courses. Then,—the valuable forests of timber, —the boundless savannahs capable of supporting countless head of cattle—and the Gold Mining Industry coupled with what has been prophesied by an expert may become a Diamond Mining Industry. Take all these together and then look for the means of communication which we find in the vast network of more or less navigable rivers, with their huge affluents and yet smaller tributaries. Sum up all these features and then, bearing in mind the statistics of the gold output to date, decide whether the inhabitants of this colony have reason to disbelieve in the future of the Gold Industry and to distrust the capabilities of the country for almost indefinite expansion or not.

There exists unfortunately one very serious obstacle to the future expansion of the colony in the labour question. The history of the past as illustrated by the old Dutch maps of the interior, shows that no reliance as permanent useful settlers and agriculturists can be placed upon those, who ought as has been said before, to have most of the wealth of, and be in leading positions in the community of which they form part. Thousands of acres granted free in Dutch times remain as free to-day; but their chief freedom is freedom from useful cultivation, or beneficent occupation; they lie waste. Immigration is the only remedy and it must be of a thrifty race who come from a sub-tropical region, and who are capable of toiling in the powerful heat of our tropical sun. The races that seem to be the most suited for introduction to the colony are Japanese, Chinese, and East Indians, who should be induced to come here, free, or under indenture,

and if possible induced to identify themselves with the country, and become so attached to the soil that they will practically accomplish the regeneration of the labouring population of the country. Free land might be given to them, or land to be free on conditions of cultivation and beneficial occupation.

The Commission now sitting is entrusted with the serious task of discerning the proper method of ameliorating the condition of the Gold Industry and the easy acquisition of Crown Lands, and has before it the two subjects of enquiry which form the principal part of its descriptive title. These are merely the pointers, so to speak, of a much more important matter, but yet a matter of which they form the main feature. The great and important matter is the Opening up of the Country, which can be slowly but surely accomplished with two such powerful factors as a Gold Mining Industry which, in spite of little or no encouragement has in the space of ten years added nearly £2,000,000 worth of solid gold to the treasure of the world; most of this too in the last three years; and of a Diamond Mining Industry, which can and must come to the front if only it be taken in hand at once and judiciously fostered.

The prosperous condition of the South African Colonies to-day is mainly due to the existence and discovery in them of the two most powerful attractions just named. The Australian Colonies, except Western Australia, owe their position to the discovery of gold. Western Australia, which occupies nearly one half of the huge continental island, was practically uninhabited and of little importance till the recent rich finds of gold brought it prominently forward. Its future can hardly

be estimated. All these countries have possessed, and still possess, along with great mineral wealth, vast capabilities for agricultural wealth also. The same can be said of this country, for in addition to the lands already in cultivation and empoldered, there are the thousands of square miles of hilly savannahs, whereon millions of cattle can be reared. To give some idea of the possibilities of cattle raising, the words of ALEXANDER VON HUMBOLDT, who visited Venezuela in the company of Mons. BONPLAND in the years 1799–1804, may be quoted. "I shall not hazard any general estimates, which from "their nature are too uncertain; but shall only observe "that in the Ilanos of Caracas the proprietors of the "great *hatos* are entirely ignorant of the number of the "cattle they possess. They only know that of the young "cattle, which are branded every year with a letter or "mark peculiar to each herd. The richest proprietors "mark as many as 14,000 head every year and sell to "the number of five or six thousand."

The most reasonable scheme of realising these valuable pasture lands is by following the gradual extension of the Gold Industry, and improving the means of communication with the new diggings as they are opened up in the direction of the savannah country. There is every reason to believe that gold bearing quartz exists in these savannahs, if the words of so generally accurate and careful an observer as the late Sir ROBERT SCHOMBURGK, may be relied upon. He constantly refers to quartz in connection with savannahs Thus he says "the "savannahs between the Rupununi and Rio Branco are "covered with numerous angular quartz rocks." Speaking of the Takutu river "he says on approaching Curata-

" wuiburi mountain in the Canuku range I found large " banks of pebbles and sand in the Takutu, the pebbles " being chiefly of quartz of a yellow and white colour; " but also I found some agates of the kind known as " fortification, from the parallel zigzag lines. Other " pebbles were of globular structure and veined with " jasper like the Egyptian pebbles. Below these beds " of pebbles and sometimes beside them, I noticed a " black sand *with minute quantities of gold of a light* " *yellow* (the italics are not SCHOMBURGK'S) but whether " the metal is present in sufficient quantities to render " washing for it profitable, must be determined by closer " examination than I could give it."

Again, " Near latitude 3° 12′ 53″ North, 26½ miles " from Pirara, I saw a remarkable geological feature—a " large block of granite gneiss was surrounded as it " were by contorted masses of gneiss, which rose 2 feet, " 6 inches above the water. The granite gneiss is " stratified at an angle of 45° pierced by veins of quartz, " and large blocks of quartz lie upon it."

Again, still speaking of this district, he says, " passed " here banks with quartz pebbles, and could trace the " quartz pebbles in the conglomerate, not cemented, for " some distance in the savannahs." In another place, " We crossed at 10 o'clock the creek Canaru, which " flows into the Rupununi. The fragments of quartz " which covered the savannahs appeared more numerous " than on the previous days, sometimes huge blocks of " the same formation pierced the soil. Our path was " fatiguing in the extreme and our feet blistered and " injured by the sharp pointed rocks." Another quotation will suffice to show how abundant quartz is in this

region. "The Wapisiana Indians call all hills which "consist of solid rock and are only sparingly covered "with vegetation, by the general name of Kuipaiti. "The hill to which we directed our course this morning "does not strictly belong to this class. The base con- "sists of granite or granite gneiss, forming (about 250 "feet above the savannah) an immense wall from 50 to "60 feet high, extending S.W. for several hundred yards. "Near the summit the substance of the rock changes. "The seams of the stratification where they are exposed "in consequence of the rains having washed off the soil, "run E.N.E., and are apparently traversed by others in "a N.E. direction, which divide the rock in the form of "lozenges. As this rock has a basaltic appearance, I "have little doubt it has pierced the granite. *Large "veins of quartz traverse this rock.*"

The testimony and deductions of HUMBOLDT regarding this part of the country, seem to add confirmation to the theory that it is highly auriferous "I have already "observed that the silvery lustre and frequency of mica "have contributed to give Guiana great celebrity for "metallic wealth, * * * According to the fabulous "stories of the natives, the islets of mica-slate, situated "in Lake Amucu, augment by their reflection the lustre "of the nebulæ of the Southern sky. * * * RALEIGH "asserts that he brought back gangues of auriferous white "quartz ('hard white spar') and to prove the richness of "this ore he gives an account of the assays that were made "by the officers of the mint in London * * * * * * "The gneiss of the littoral chain contains traces of the "precious metals; and some grains of gold have been "found in the mountains of Parima near the mission of

" Encamarada! How can we infer the absolute sterility
" of the primitive rocks of Guiana from testimony merely
" negative; from the circumstance, that during a journey
" of three months we saw no auriferous vein appearing
" above the soil? In order to bring together whatever
" may enlighten the government of this country on a
" subject so long disputed, I will enter upon a few more
" geological considerations. The mountains of Brazil,
" notwithstanding the numerous traces of imbedded ore
" which they display between Saint Paul and Villa Rica
" have furnished only stream works of gold. More than
" six-sevenths of the seventy-eight thousand marks
" (£52,000) of this metal, with which at the beginning
" of the 19th century, America annually supplied the
" commerce of Europe, have come, not from the lofty
" Cordilleras of the Andes; but from the alluvial lands
" in the east and west of the Cordilleras. These lands
" are raised but little above the level of the sea, like
" those of Sonora in Mexico; and of Choco and Barbacoas
" in New Granada; or they stretch along in table lands
" as in the interior of Brazil. Is it not probable that
" some other depositions of auriferous earth extend
" towards the northern hemisphere, as far as the banks of
" the Upper Orinoco and the Rio Negro, two rivers
" which form but one basin with that of the Amazon? I
" observed, when speaking of El Dorado de Cañelas, the
" Omaguas and the Iquiare, that *almost all the rivers
" which flow from the west, wash down gold in abun-
" dance very far from the Cordilleras,* * * * * The
" plains of Ramora * * * in fine all the country com-
" prised between Juan de Bracamoros and the Guaviare
" preserve their ancient celebrity for metallic wealth.

" More to the east between the sources of the Guainia " (Rio Negro) the Uaupes, the Iquiare, and the Yuru- " besi, *we find a soil incontestably auriferous.* There, " ACUNHA and Father FRITZ placed their Laguna del " Oro; and various accounts which I obtained at San " Carlos from Portuguese Americans, explain perfectly " what LA CONDAMINE has related of the plates of " beaten gold found in the hands of the natives. *If we* " *pass from the Iquiare to the left bank of the Rio* " *Negro, we enter a country entirely unknown, be-* " *tween the Rio Branco, the sources of the Essequibo* " *and the mountains of Portuguese Guiana.* ACUNHA " speaks of the gold washed down by the northern tribu- " tary streams of the lower Maranon such as the Rio " Trombetas (Orixinoina), the Curupatuba and the Gini- " pape (Rio de Paru). *It appears to me a circum-* " *stance worthy of attention that all these rivers descend* " *from the same table-land, the northern slope of which* " *contains the lake Amucu, the Dorado of Raleigh and* " *the Dutch, and the isthmus between the Rupununi* " *(Rupunuwini) and the Rio Mahu (Ireng).* There is " no reason for denying the existence of auriferous allu- " vial lands far from the Cordilleras of the Andes, on the " north of the Amazon; as there are on the south in the " mountains of Brazil. The Caribs of the Caroney, the " Cuyuni and the Essequibo, have practised on a small " scale the washing of alluvial earth from the remotest " times. When we examine the structure of mountains " and embrace in our point of view an extensive surface " of the globe, distances disappear; and places the most " remote insensibly draw near each other. The basin of " the upper Orinoco, the Rio Negro and the Amazon is

" bounded by the mountains of Parime on the north and " by those of Minas Geraes and Matogrosso on the south. " The opposite slopes of the same valley often display " an analogy in their geological relations."*

A discovery of SCHOMBURGK'S which may be mentioned here in connection with the opening up of the country, and of this savannah country in particular, is the following:—Near the " Quitaro River" we had to cross numerous swamps abounding in a species of cocao *(Theobroma bicolor)*. The large melon shaped fruits of all sizes, " some green, some of a bright yellow, were " eagerly collected by the Indians, who however did not " appear acquainted with the fine aroma which the seed " itself possesses—we collected a number of seeds of " which I counted as many as sixty in one capsule. " They afforded us for some mornings the most delicious " cup of cocoa I ever tasted. It is remarkable that " cocoa in its wild state is only found in swampy, or at " the best moist situations. The trees which I observed, " although of a peculiar growth, almost shrubby, and " the trunks less developed than in large forest trees, " often attained the height of 50 feet. The capsules " were large and contained from sixty to seventy seeds, " which were larger than in the cultivated kind but not " so thick."

In *Reports on geology of British Guiana by Charles B. Brown, F.G.S. and J. G. Sawkins, F.G.S.*, p. 94, B. Concretionary Iron Ore, it is stated that: " On the

* Humboldt's Personal Narrative Vol. iii, page 139. It seems certain from several historical notices that there exist two groups of auriferous alluvial land * * * and the other between the sources of the Essequibo, the Caroni and the Rupunuri (Rupununi).

" savannah it frequently occurs on the surface in the form " of gravel, with black shining exterior. The cause of " this is explained by the clay and sand beds overlying " the gravel or concretionary iron ore having been " washed off.

" *It is in these formations the greater portion of the* " *gold obtained from Caratal in Venezuela is found,* " *which I suggested as my opinion prior to that fact* " *being known to me.* (See my report on the Cuyuni " River, 1868.)"

To return again to the subject of possible quartz mining in the savannahs, there is no doubt that if the stone is proved to be sufficiently rich to pay working expenses, many mines will be found and the run of the different veins and lodes easily and rapidly determined owing to the absence of dense forest from the surrounding country. One of the greatest difficulties in the way of finding the direction of quartz veins is the forest, and in fact the words of Mr. W. T. BLANFORD, F.R.S., in the Article " Geology," (Hints to Travellers published by the Geographical Society) may be fitly quoted. " Dense forest," he says, " is perhaps the " worst obstacle to geological exploration."

Regarding the occurrence of gold in this colony and the many localities where it is found, it may perhaps help to open up districts and lead to important discoveries, to state that the Indian name for gold is *caricuri* and the prefixes *cari*, *curi*, *cura*, *curu*, and *cori*, to many of the names of places, rivers and streams of the colony which may be noticed on consulting any large map possibly denote the existence, in the vicinity of these different spots, of either auriferous soil or rock. Speak-

ing of this word *Caricuri*, HUMBOLDT says in his *Personal Narrative* (Vol. 3, BOHN'S Edition page 51, also page 344, note): "This denomination clearly indicates "the country of gold, for I find that this metal is "called *Caricuri* in the Tamanac, and Carucuru in the "Caribbee. Is it a foreign word that word that de- "notes gold among the nations of the Orinoco as the "words sugar and cotton are in our European languages? "This would prove that these nations learned to know "the precious metal among the foreign products which "came to them from the Cordilleras* or from the plains "at the eastern back of the Andes."

At the present time, and unfortunately somewhat to the discredit of the colony, the reported diamond discoveries in the Mazaruni have not been followed up and thoroughly investigated. What is now required is an exhaustive inspection of the diamond bearing ground, and full reports on the locality, with directions for reaching it, accompanied by a carefully made chart of the Mazaruni River and the main creeks in its neighbourhood, together with the direction of a suitable path by which to reach the diggings from the riverside. This should be taken in hand without delay and if it prove feasible, and the reports on the diggings are favourable enough to warrant the expenditure of money to open up and improve communications with it, this should be done. Cheap copies of the map when made might be reproduced by the ferro-prussiate process of photography and issued to the public to induce them

* In Peruvian or Quichua (lengua del Inca) gold is called *cori*, whence are derived *chichicori*, gold in powder and corikoya, gold ore.

to try their fortunes on the ground as well as to serve as guides to prospectors.

As regards towns and settlements in the forests, these may be gradually founded in the important districts, if the sale and purchase of gold and merchandise be permitted in the districts, and as has been suggested in evidence before the Commission already mentioned, if the labourers are paid off in the localities where they work. British Guiana is at present not a poor man's gold mining country, chiefly on account of the difficulties of travel, which necessitate the carriage of large stores of provisions, the employment of many boat hands, large boats and experienced captains and bowmen. Much of this might be avoided were there a resident gold mining population in the forest, surrounded by cultivated fields and pasture land with cattle thereon, and in a manner thoroughly self-maintaining and self-dependent. The means of intercommunication must clearly be the different rivers and smaller streams wherever practicable; and where communication must necessarily be by land, bush roads must be made. Throughout the vast territory of Venezuela it is safe to say there are not many miles of macadamised road, and, almost all the roads that traverse the country are bush roads or roads through the savannahs fit for pack and draft animals donkeys, horses and mules. In certain parts of Trinidad these bush roads have long existed and proved of immense service to the Island before the better and metalled roads were made. In wet weather they often became actual quagmires, but nevertheless traffic was maintained over them. Here the experience in the wallaba bush, where shingles and posts are carried long distances

through the forest in mule carts, is, that the roads stand the traffic well, and not being cut very wide open, do not admit enough sunlight to allow of the too rapid growth of all kinds of bush ropes and creepers and small trees, which might render the maintenance of the pathway a matter of even very small extra expense after its first construction.

There is unfortunately no rich leisured class in the colony who from pure love of adventure and travel would add to the general knowledge of the interior of the country by carefully chosen spheres for exploration. The only leisured classes are by a curious anomaly the black labourers and the bucks; the former enjoy their cessation from toil at the beginning and end of every week, while the latter appear to maintain an unending indefinite holiday, and nothing can be expected from either of these classes to add to the small amount of information at the disposal of the traveller. All must be done either by Government or private enterprise. For private enterprise the Steamer Contractors must be commended for the way in which they have helped to facilitate access to the interior, so far as their steamers have, up to the present, been able to penetrate, as instanced by the large number of voyages made by their boats over and above the number required by the terms of their contract. In this, of course, business acumen has pointed out how very much to the advantage of the Contractors the increased though unsubsidized steam service would be. There is, however, a far wider field yet before them and there is also scope for the energies and capital of any one who may in the future secure the right to navigate the higher still-water reaches of the

various waterways of the colony, when the Government are warranted by the spread of the Gold Mining Industry to invite tenders for this special service. A seldom considered source of prosperity to the colony lies in the immense tracts of fertile coast lands, where rice, the main food of the East Indian population, can be grown, not only to supply local needs, but also for export. The aomunt annually imported into the British Isles is between eight and nine millions of hundred weights. The local consumption is 37,800,000 lbs., and bearing in mind the large number of men and women that the imminent abandonment of some of the sugar estates will put out of work, and the difficulties to be experienced in finding reasonable employment for them as well as the very grave question of possible food and labour riots if work be not forthcoming, it does seem that active, and indeed very active steps should be taken to throw open to cultivation the immense tracts above referred to.

The "Divinity that shapes our ends," may unknown to us have decreed that the abandonment of sugar properties is to be the turning point in the Colonial history; and that the labour set free from the sugar fields is to be utilised on the rice patch, the gold placer, and the provision ground in the forest. Full warning has been given of the coming crisis and it is for the inhabitants to manfully accept the new order of things, and while supporting sugar as it deserves, to provide other avenues of employment and of wealth and prosperity. To foster and encourage the gold industry, to work with a set plan for the opening up of the country gradually, and the improvement and

maintenance of communication with the interior, may safely be recommended to our administrators as the wisest and soundest of policies to ensure future prosperity. There is no need to assure the Government of the unbounded faith that the colonists have in them, nor to prove their loyalty and the ready way in which all will be found to respond to any beneficial legislation that the Government may think fit to enact for the improvement of the Gold Industry or any other Industry generally. If proof be required, let those who can remember the time, call to mind the vast impetus given to the Gold Mining Industry in 1886–87, immediately after the regulations for mining became law. Previous to the passing of the regulations, few persons in town knew that gold was even being obtained in any quantity in the colony; and still fewer were those who embarked capital in prosecuting the search for the precious metal. Immediately the Government took the matter in hand, speculation became general, because everybody had the fullest confidence that by their action the Government meant to protect and help the Industry; and from all quarters money came pouring in freely for expeditions into the interior. The experience of the past in this is bound to be repeated, and it may be said again that the wisest of all policies now, is to assist the Industry and vigorously push it forward with the immediate prospect of generally increased prosperity to all in the colony.

Occasional Notes.

By the Editor.

Bites and Stings.—RICHARD SCHOMBURGK'S account of the death of poor KATE (*ante* p. 312) reminds us that we have very few reliable accounts of the effects of venomous bites and stings. As for popular ideas on this subject they are exceedingly vague, the common expression in regard to what does not kill being, that it "gives fever." Except the bites of ants we have rarely experienced any of these, yet it may be interesting to give an account of three cases.

The most virulent was undoubtedly that of a mason wasp or "mud dauber." While hanging up our hat in an open gallery we must have gone too near its nest, the consequence being a sting on the second finger of the right hand. The immediate effect was a burning pain as if a hot needle had penetrated the skin, soon followed by numbness almost amounting to paralysis. The finger was slightly swollen and very shortly afterwards the stiffness extended over the whole hand and up the arm to the shoulder. The pain was trifling but the whole arm and hand was so paralysed as to prevent their being used properly. It was with very great difficulty we could use our knife at dinner and the stiffness, although it became gradually less, could be felt up to the third day. From these feelings we could easily understand that the numbing effect on a spider must be something very great; no wonder that it produces catalepsy for weeks or even months.

We have never been stung by a scorpion, but on one occasion found ourselves bitten on the back of the neck, or rather between the shoulders, by a small centipede. We were led to expect something very painful, but as a matter of fact it was hardly worth thinking about. True, the creature was young and not more than two inches in length, but there was little pain and no signs of anything like the paralysis of the mud dauber. The place was hot and sore for a time, but not so fiery as the bite of the common red ant and in an hour or two the pain was entirely gone.

In handling some newly collected orchids on one occasion we were bitten on one of our fingers by what at first we thought was a poisonous snake. As we did not catch sight of the creature we thought it best to take every precaution. There were the marks of two fangs, and soon after a slight swelling and a rosy blotch the size of a shilling. We tied the finger tightly below, sucked the place, applied some iodine liniment which happened to be at hand, and in an hour or two felt all right. There was never anything more than a slight burning sensation, but as we squeezed and sucked and burnt the part with the iodine it can hardly be said that this was all that might have resulted without interference. In looking over the orchids afterwards we found a large hairy spider *(Mygale)* and believe this must have been the culprit.

There appears to be great differences in the effects of bites and stings according to constitution and temperament. The new-comer suffers much more than an old colonist, as is well known, especially if he is of the florid robust type; thin wiry people on the contrary are

little affected. Probably in the case of mosquitoes a sort of inoculation takes place, after which the poison has little effect.

In connection with this matter we may mention that when a gnat or other small insect gets into the eye, however painful it may be, the instinctive desire to rub it should be carefully avoided. Once we suffered for two days from killing a gnat under one of the eyelids and since then have escaped inconvenience by letting them always crawl out again, which they generally do very quickly or by letting the consequent flow of tears wash them away.

There is a hairy caterpillar in which the hairs resemble the sting of a nettle. These are much dreaded, and although the popular notion is undoubtedly exaggerated, the effect is sufficiently painful to account for their careful avoidance. From the statement of a medical friend who was stung by one or more of these hairs, it appears that there was a numbing effect similar to that produced by the mason wasp; possibly this would cause a bird to drop the creature at once when its mouth was stung.

Text-books for Botanical Students.—For over twenty years past we have been asked now and again to state where a beginner can find an account of the plants of Guiana so as to be able to recognise them. In the absence of anything like a Flora of the country we have always had some difficulty in answering the question and could only point to our library, or enter into a long explanation. Perhaps a few hints as to the best books may be useful, and if they lead anyone to take up the

study of botany will help on what is undoubtedly a good work.

To begin with the books that are absolutely necessary. First, we have GRISEBACH'S "Flora of the British West Indies." This is very useful indeed, especially for the coast plants, as these are virtually identical with species found in Trinidad and the more southern islands. A beginner can get along fairly well with this book alone up to the time when he begins to visit the forest region. Now and again he will come upon something which he cannot identify, but this may be preserved until a later period when his knowledge of the more wide-spread species is fairly complete. If he wishes the assistance of illustrations there are several old books such as those of PLUMIER, JACQUIN, and SWARTZ, which will help him considerably. These are referred to by GRISEBACH, so that there will be no great difficulty in finding them out however obscured they may be from their out-of-date nomenclature.

Having got so far as to be able to identify almost everything in his neighbourhood, the student may prepare himself for the more difficult task of identifying the plants of the forest region, and here he will meet with many checks. GRISEBACH helps him but little and there is no single book of the same kind which can be utilised. However, he need not despair as there are a few books which will prove of very great assistance. First among these we place the third volume of RICHARD SCHOMBURGK'S "Reisen in Britisch Guiana," which contains a list of the plants found by that indefatigable botanist. Unfortunately it does not contain descriptions, and therefore the student has to go farther for these, but neverthe-

less even such an index is by no means to be despised. Most of his early "finds" will be included in this list—in fact, unless he has special opportunities he will hardly discover any species not mentioned. Having checked off every plant that he has seen, the list will be much reduced, so that instead of having to wade through a crowd of species he only has perhaps half a dozen to investigate. If he is "well up" in the genera and their divisions he can often make a fair guess by elimination. Thus, he knows all that are checked off, so the new plant is not one of these—then it belongs to a certain division of which only one or two are strangers, therefore it is likely to be one of these, and there may be something in the habitat that makes the enquirer morally certain that it can only be so-and-so. Now, to confirm this guess it is necessary to have access to a few books which are perhaps not so easily procurable. First among these we place the "Contributions towards a Flora of South America" published in *Hooker's Journal* of Botany. This is very incomplete as a list of Guiana plants, yet there are many species first described here. Then come three books which will be found very useful as they are authorities for many species, viz. Aublet's "Flora de la Guyane Française," Meyer's "Primitiæ Floræ Essequeboensis," and Rudge's "Plantarum Guianæ Icones." Finally, we have the whole field of botanical literature, commencing with that indispensable book Decandolle's "Prodromus." An exceedingly useful work is the "Flora Braziliensis" which has been coming out in parts for over half a century, but unfortunately it is beyond the means of most botanists.

We have presumed that the student has obtained

some knowledge of botany before commencing to study the flora of Guiana and here he meets with a great difficulty at the very commencement. His text-books have dealt with the plants of the country where they were published, and the authors took their examples from the fields, woods and gardens around them. There is no introduction to botany in which plants from Guiana, South America, or the West Indies are utilised in a similar way, and therefore a new alphabet as it were must be learnt. This however is not so difficult as it appears at first sight and with a little perseverance the natural orders become quite as familiar as those which are so well represented in Europe and North America. It would undoubtedly be a good thing if some botanist were to publish an introduction to botany for tropical America, but unfortunately the small amount of support likely to be given would prevent such a work being a financial success.

Ward's Trench.—Since we published Mr. KIRKE'S paper on the Early years of the Lamaha Canal (*Timehri* 1893, p. 284) we have seen a document which gives some interesting particulars bearing on WARD'S Trench. HUGH HUGHES, attorney of JOSEPH WARD of Liverpool, proprietor of Pln. Industry and also of Lots 9 and 10 in No. 3 Canal, extending from the third depth of Industry to the Canal, these not having been put under cultivation and therefore doubts having arisen as to their having lapsed to the crown, petitioned Governor D'URBAN to have them secured. What was the date of this first petition does not appear but a second was dated August 31st, 1826, this stating that a trench commonly called

WARD'S Trench had been dug out at his expense along the western side line of the second and third depths of Pln. Industry, and that the Canal lots which were considered to have reverted to the Crown had been taken possession of in order to facilitate the bringing of the waters of the Lamaha Creek to Georgetown. A third petition dated September 21st, 1826, set forth that by the sacrifice of the convenience of his navigation in giving up the Trench, which had been dug at great expense, he had in fact contributed more labour towards bringing fresh water to town than other estates which derived benefit therefrom, and which had also claimed remuneration by grants of land. In consideration of the circumstances, on the 13th of March, 1829, permission was granted to the proprietor of Pln. Industry to resume possession of the Canal lots and to occupy during His Majesty's pleasure certain lands adjoining the Lamaha Canal.

A Method of getting round the Rapids.—In reference to water communication, which is undoubtedly indicated by nature as the best mode of opening up the colony, the Hon. N. D. DAVIS sends the following:—

Dating from Himarracka, on the Mazaruni River, Mr. A. B. BARNARD, the successful gold-finder, wrote to a friend in Georgetown, on the 9th December last, as follows:—

"I wish to explain to you that the difficult falls are few, and that the greater part of the river is open and deep, as well as perfectly safe, (I speak exclusively of the Mazaruni). And further, on close examination it will be found (as I am already aware) that there is a

large number of narrow "Itabos" (that is, side passages), which are dry part of the year, being cut off from water by high rock at the upper end or entrance. Now, to deepen the head of such a passage, and supply it with Locks of the splendid Greenheart that is growing at hand, is my plan.

"By utilising these side passages, and introducing water; which is the most important factor, and is plentiful; all the many miles of the river can be brought into cheap and effective connection with tide water, and also all the tributaries, many of which are very large rivers themselves, requiring many days in the boat constantly going, to get to any obstruction.

"It would certainly surprise you to see what grand rivers these branches are. We are, besides, at least 280 miles here, above the last fall; a wide river, say as wide as the Demerara at Georgetown.

"The resources of the country inland are almost unlimited. Timber and Gold and other metals, are at present secondary. But, for Crops and Cattle, it is equal to the best. The possibilities are very great."

The Chief Justices of British Guiana.—We have to thank Mr. H. KIRKE for the following:—

Owing to the recent retirement of Sir DAVID PATRICK CHALMERS, from the office of Chief Justice of British Guiana, it may seem opportune to give a list of all the Chief Justices, Judges, and acting Judges who preceded him on the Judicial Bench of the Colony. There is some difficulty in furnishing a perfect List, but the following will be found to be fairly accurate. It may be noted that there have been only six Chief Justices of British Guiana

since the Supreme Court was established on Nov. 22nd, 1831, viz: WRAY, BENT, ARRINDELL, BEAUMONT, SNAGG and CHALMERS; of these, four have died in harness in the Colony, one was dismissed from his office, and Sir DAVID CHALMERS alone has retired on a well-earned pension.

In 1832 Charles Wray, Esq., was Chief Justice and J. W. Willis and Samuel Firebrace were the Puisne Judges. In 1835, the pay of the Chief Justice was £3,000 and each of the Judges received £2,500.

Date.	
1840. Feb. 25	... William Furlonge, Acting Judge.
1842. May 16	... William Furlonge, „ „
1842. March 1	... Henry Gloster, „ „
„ June 24	... Jordan Roche, „ „
1844 „ „	... Thomas Norton, Judge.
1844. Oct. 14	... Robt. Rutledge Craig, Acting Judge.
1844. Nov. 30	... John Downie, Judge.
1846. July 6	... Robt. Rutledge Craig, Acting Judge.
1846. Sept. 30	... Robt. Crosby Beete, Actg. Judge.
1846. Oct. 15	... Enno Lambertus Christiani, Acting Judge.
1847. July 11	... Jeffrey Hart Bent, Chief Justice.
	[Bent, C.J., died June 29th, 1852.]
1847. Aug.	... William Arrindell, Acting Chief Justice.
1847. Nov.	... John Downie, Acting Chief Justice.
1847. Nov.	... Robt. Crosby Beete, Acting Judge.
1848. June 13	... Robt. Crosby Beete, „ „

1849. Dec. 22 ... Enno Lambertus Christiani, Acting Judge.

[*vice* Saml. Firebrace, decd.]

1849. Dec. 22 ... Robt. Crosby Beete, Acting Judge.

1850. Nov. 11 ... Robt. Crosby Beete, „ „

[Mr. Beete was subsequently confirmed as a Puisne Judge.]

1850. Nov. 11 ... Enno Lambertus Christioni, Acting Judge.

1852. June 21 ... William Arrindell, Acting Chief Justice.

1852. June 29 ... William Arrindell, Prov. Chief Justice.

[In consequence of the death of Bent, C.J.]

[William Arrindell was subsequently confirmed as C.J. and Knighted.]

1852. ... Adam M. Alexander, Judge.

1853. April 27 ... John Noble Harvey, Acting Judge.

1862. Dec. 29 ... John Lucie Smith, Prov. Chief Justice.

[In consequence of the death of Sir William Arrindell.]

1863. April ... Joseph Beaumont, Chief Justice.

1865. Nov. ... Bernard Gustavus Norton, Judge.

1865. Aug. 9 ... John Lucie Smith, Acting Chief Justice.

[In consequence of the suspension of Beaumont, C.J.]

1865. Nov. 8 ... James Crosby, Acting Judge.

1868. Aug. 8 ... John Lucie Smith, Acting Chief Justice.

[In consequence of the removal of Beaumont, C.J.]

1868. Dec. 5 ... Sir William Snagg, Chief Justice.

1868. Feb. 24 ... John Hampden King, Judge.

1869. Mar. 10	... W. F. Haynes Smith, Acting Judge.
1869. Decr. 8	... W. F. Haynes Smith, acting Judge.
1870. Mar. 25	... James Crosby, „ „
1871 Aug. 31	... George Phillipo, „
1873. Sep. 23	... Conway Whithorne Lovesy, „
1874. April 7	... Henry Kirke, acting „
1875. Oct. 26	... J. Hampdon King, acting Chief Justice.
„ „ 26	... Nicholas Atkinson, acting Judge.
1878. Jan. 19	... Hugh Riley Semper, „

On the Summit of Mt. Roraima.—Mr. QUELCH, who returned on the 23rd of January from a long journey in the interior has favoured us with the following note :—

Since the discovery of a path to the summit of this famous mountain, and its first ascent in 1884 by Messrs. IM THURN and PERKINS, several orchid collectors have made the ascent; but little, however, has been contributed by them to our knowledge of its Topography. Taking advantage of the opportunity afforded by our expedition to the great Savannah, Mr. F. V. MCCONNELL and myself, accompanied by Mr. C. A. LLOYD, determined to make a more detailed examination of the summit than had hitherto been attempted. Leaving the Makusi village of Kwaimatta with 39 Makusi and Arrekuna bearers and with two taxidermists in the middle of October, we reached the Arrekuna village of Kamaivawong at the base of the mountain on November 3rd, after a most arduous walk of 17 days, across the intervening mountains—portages of the Ireng and Kotinga Rivers having been made at Karona Falls and

Sokoking respectively. Three days were spent in reconnoitring the path and in building a half-way house at a height of 6,400 ft., and on the 7th the ascent was made to the summit along the path discovered by Mr. IM THURN, which we found to present no difficulty whatever as regards climbing, though the walking was intensely arduous and tiring. The general aspect of the plateau on the summit fully bore out the description as given by Mr. IM THURN, though our more extended examination during the two nights and three days spent there enables us to add to it considerably. The extent of the summit should be described as presenting not the aspect of a hollow basin, but of a plateau which has been worked by aërial denudation into altogether irregular and broken series of deep valleys and precipitous ridges, the total difference between the lowest and highest points being more than 400 ft. The ridges are frequently broken into isolated peaks, the highest being 8,740 above the sea level, presenting the aspect of piles and terraces of irregular boulders and masses. The valleys wind about in almost an endless maze, lake-like shallow pools, more or less obscured by an abundant dwarf vegetation of more than fifty species of *Xyris*, *Pœpalanthus*, *Abolboda*, *Heliamphora*, *Stegilepis*, *Brocchinia*, *Bonnetia*, *Epidendron*, *Lisianthus*, *Befaria*, etc., and various ferns, lycopods and mosses, succeeding each other at close intervals. After the slightest rains the surplus water is carried off along these valleys as an overflow to the ravines on the edge, descending to the slopes below as waterfalls to swell the various surrounding streams. Many small trees are spread over the valleys, and climb up in a densely packed bushy

jungle along the western slopes of the higher ridges, the common species of *Bonnetia (B. Roraimæ)* being at once the most abundant and the largest, reaching to a height of more than thirty feet. Three species of birds, a mammal, a toad, an earthworm, a woodlouse, two spiders, two myriapods, a dragon-fly, a butterfly and a few other small insects—chiefly beetles,—are to be found on the summit, and doubtless more complete examination will greatly extend the list. The sandstone and conglomerate which form the entire mass of the summit, are worked into almost every conceivable grotesque shape, and are more or less darkened by weather and saturation with water, fine layers of sandy shale here and there projecting from the mass. Clouds and mists of various degrees of density constantly lie on or pass across some portion of the plateau and made it a difficult matter to secure good photographs. The cold winds and low temperature (47° F.) make it necessary to secure good shelter for the night; while the rugged character of the plateau entails a considerable amount of time for its exploration. Descending on the evening of the 9th, at the urgent entreaty of our Indians, to the village at the base of the slope, we had to make arrangements for leaving on the 12th, and after a journey of 11 days, *via* the portage of Kalisha-sararu on the Kotinga and Karona Falls on the Ireng, we arrived at Kwaimatta on the 23rd November after an absence of 36 days. A more detailed account will be given later.

Report of Meetings of the Society.

Meeting held July 12th.—Mr. R. G. Duncan, F.R., President, in the chair.

Members present 20.

Elections.—*Members:* Messrs. E. D. Wight, E. H. King, M. J. Morpurgo, A. Moody Stuart, R. J. Gaskin, D. C. Evans, Geo. W. Brown, A. R. Labad and H. A. L. Rowe.

The annexed reasons for awards at the Columbian Exposition were laid over :—

Max & Co.; Essence of Tonka.—For excellence of Flavour.

Coolie Colonist; Gold and Silver Ornaments.—Originality of the design; novelty and good workmanship.

Booker Brothers; Bath Tubs and Vat.—Good workmanship, and the peculiar properties of Wallaba wood, which makes the tubs and vat non-absorbent and thus sanitary.

Park & Cunningham; Collection of Woods.—A full hand collection of all the important woods of the Colony, permitting ready inspection of their structure and qualities, thereby conveying valuable information.

Julio Siza; Photographs; Illustrating the Habitations, Industries and Peoples of British Guiana.—This collection of photographs represents the various races and types of British Guiana. The Chinese and Coolies, or East Indians, show the imported working classes; the Negro, the race left from the days of African slavery: the Forest, Savannah and Coast Tribes of Indians, the natives of the country; the Spanish, French, Creole types, and the Scotch and English.

The series shows adults and children, and forms an interesting study of race and climatic modifications. There are pictures of native houses, of scenes in the primeval forest, and views of the present remarkable development of the country under the influence of European enterprise. The entire collection is a valuable contribution to an understanding of the people of British Guiana and their environment.

British Guiana Exhibition Committee; Stuffed Fishes, Reptiles.—

For a collectively interesting and good representation of the fauna of British Guiana.

British Guiana Commission; Bark Hut.—This is a careful reproduction of the dwellings of the natives of British Guiana who live upon the Savannahs. The workmanship is most interesting, the outside parts of Tau-ra-ne-ro wood are carefully chipped after the bark has been peeled, and the thatch of palm leaves retains its symmetrical beauty after months of exposure to wind and storms. The interior arrangements have been carefully arranged, showing the hanging Babracot for the storage of valuables, as well as the same frame-work which is set up outside the hut for smoking and drying meat. Much praise is due the British Guiana Commission for its labour and care in reproducing this interesting exhibit.

British Guiana Commission; Collective Ethnographic Exhibit of British Guiana; Indian Pottery, Gourds and Wooden Vessels.—The value of this complete exhibit of utensils for cooking and storage of food and water is greatly enhanced by its admirable classification and arrangement. No labour has been spared to bring together from widely separated and isolated localities, specimens to represent all kinds of vessels in use among the natives of British Guiana.

Indian War Canoe.—This canoe belongs to the Macusi Tribe of British Guiana and has been transported at great labour and expense, and is a most valuable contribution to the study of native art in canoe-building. The body, about thirty-seven feet long, is hollowed by fire and chipped into the desired form, which is low and broad, adapted to river travel; the height is gained by the addition of a top board of crab-wood which is fastened by Karamani and calked with fibre. This is a War Canoe similar to those once used by the Caribs. It is a most valuable contribution to the study of the natives of Guiana and is the first of its kind to be placed beside similar crafts built by Indians of the North Pacific Coast for purposes of comparison.

Household Utensils and Furnishings.—This collection is of great value in the line of native arts, especially wood carving, textile art, bark-work, cloth, and hammocks of all known types. Especial care has been given to show the types of Geometric-ornament in basketry. There are several hundred objects from the Guiana tribes and of ancient dates. The objects are chosen by function and by tribe. The cases and many of the objects are carefully labeled.

British Guiana Commission; Dug-outs from Demerara River; Two

Bark Canoes: Dug-outs.—Native dug-outs from Demerara River. They show a curious mode of transportation, and illustrate the manners and customs of the country.

British Guiana Commission: Large series of the different groups of Birds with Nests and Eggs.—An excellent representation of the bird-fauna of British Guiana.

British Guiana Museum: Large series of many mounted and flat skins of Mammals of the chief species of the different Orders.—This exhibit comprises a large series of flat skins of mammals of the chief species of the different orders of the characteristic mammals of British Guiana. It is of much scientific interest and value.

British Guiana Museum: Indian Necklaces, Aprons, Hammocks and Frames of all Descriptions.—The collection of seed and bead necklaces worn by women, and those of filed Peccary teeth with long pendants terminated by brilliant birds, worn by the men, is large and valuable. The Queyu or aprons, the sole garments of the women are classified according to tribes; the bark aprons of the Swamp Indians, the cotton ones of the Savannah tribes. A peculiar point of interest is well brought out, that the design woven with beads are reproductions of those used by the different tribes in their basketry. The looms set for weaving are shown. The hammock making industry is admirably illustrated. The palm fibre, the cords and ropes beautifully twisted, and the well finished hammock display the skill of the Warrow tribe; while the raw cotton, the several grades of yarn, and the remarkable variety of netting of the Macusis are shown. The Arawak Indian combines the cotton and palm yarn in his hammock. The entire collection is exhibited with ethnographic skill.

British Guiana Museum: complete series of Indian Basketwork.—This exhibit forms a very complete series of Indian Basketwork, the various types made by the natives being well exemplified: the large suriana made of bark fibre, and used as pack or pannier baskets; the quake made for temporary purposes, or for permanent wear; the forms used in cotton picking; and the Pegall or covered baskets, from the little receptacle of two inches square to those of large size. The ornamentation of these baskets of reed and bamboo is of much interest. Care has been taken to gather the various patterns, woven in black or red and the natural colour of the material. Basketry is also shown in the matopee, used for squeezing the juice of the cassava, and in the sifters which are in many sizes and styles of weaving; mats, trays and

coverings for pottery, to protect the large earthern pots and by which to carry them, are also included in this industry, as well as fans for blowing the fire, fish-traps and ant baskets, used to catch ants and apply them to the backs of youths to train them in endurance and prepare them for the life of a hunter. The entire collection shows the customs of the native races and their skill in weaving free-hand designs, the turkey pattern being one of the most curious.

British Guiana Museum; Special collection of Feather Crowns of Guiana Indians, Stone Implements.—The collection is comprised of twenty-six feather crowns, embracing the types used among the Indians of British Guiana. These with the feather shoulder capes, form a valuable series for the study of the ceremonies of the native people. Specimens of all the species of birds from the feathers of which these ornaments are made are exhibited. The small collection of prehistoric implements is of much scientific value.

Royal Agricultural and Commercial Society of British Guiana; *Timehri*, the Scientific Journal of Guiana; Several Volumes.—The *Timehri*, a Semi-yearly Journal published by the Royal Agricultural and Commercial Society of British Guiana, took its name from the native's appellation of the pictured rocks on the large rivers, the work of some ancient and forgotten tribe. The volumes exhibited contain many papers based upon original researches in geology, and the fauna, flora and native races of British Guiana. This able journal also records much of the history of the colony and the enterprise of its citizens, and displays the intelligent zeal and public spirit manifested by the Royal Agricultural and Commercial Society in the establishment and maintenance of its Museum, Library, Reading Room and Scientific course of Lectures. This Institution, therefore, not only is to be commended for this exhibit of its work, but commands the sympathy and support of all persons interested in the development of the Sciences in South America.

Letters from the Government Secretary were read, acknowledging the receipt of the final report of Mr. Commissioner Quelch on the Chicago Exhibition, and also the recommendation of the Society passed at the previous meeting. In reply to the latter he stated that "it will afford His Excellency much pleasure to comply with the request of the Society and forward the resolution to Lord Ripon."

The paper read at the previous meeting on the "Cost of sugar production in British Guiana" having been declared open for discussion :—

Mr. Thorpe said, as a West Coast Manager, he thought it impossible to make sugar at the price mentioned—at least during the last four years.

The President in reply, stated that the figures he had given applied generally, not to any particular district or season. He was willing to admit that during the last few years it was impossible—he did not know any estate that had done it.

The Hon. B. Howell Jones said that from his experience he had come to the conclusion that prepared estimates were misleading. It was almost impossible to say in January what the crop would be by December, or what the expenses would amount to. In heavy rainy seasons the cost would be above the average—the expense of coal for the draining engine being considerably more. Some of the expenses were to a certain extent under control—others, such as those dependent on the seasons were not. Looking over his note book he found that some years ago one estate made sugar at a cost of $61 a ton and another at $103. The position of estates had a great deal to do with this. Where, as in Berbice, large areas of rich land could be taken into cultivation, the returns were much better than in other places with a limited area. He did not agree with Mr. Luard in his statement that managers did not know the things mentioned in the President's paper. He knew that on the contrary they compared notes with each other to try and lessen the cost of production. He thought the paper very valuable and he had no doubt it

would assist in keeping them up to the mark in future.

The Hon. Mr. Luard said he did not state that the managers were ignorant of the cost of the different operations but only that some did not go into the details.

The Hon. N. D. Davis said that the paper referred to the burning of trash in Berbice. If this was done there with satisfactory results why was it not adopted in other parts of the colony? He understood that it was a preventative of the borer and also useful to destroy rats.

The President referring to the remarks of the Hon. Mr. Jones, said that he did not think any manager could make sugar at $68 a ton under present conditions, and he was willing to admit that during late heavy seasons it had cost $100 in some places. His object was to point out that unless they could produce sugar for an average of years with present prices they would be unable to go on at all. He wished them to look this fact squarely in the face, and he did not think they would argue that the sum ought not to be sufficient under average conditions. Sugar was going down again and something must be done to reduce the cost of manufacture. In regard to trash burning, he believed it had originally arisen from cane-cutters refusing to work unless it were done, probably for fear of snakes. As far as he knew no damage was done by the practice and it saved the expense of burying the trash. In Demerara the trash was buried as manure, and where the land was not as rich as in Berbice this was desirable, but he thought the practice could be introduced on many estates without injury.

The Hon. Mr. Jones said he had seen the eyes of the

canes so burnt that they did not spring after the crop was cleared away. In most cases however he had seen trash burning carried out without injury and he even thought the ashes of some value as manure.

Professor Harrison said the burning could only be valuable mechanically, as the ashes had no manurial value.

The President thought that if the eyes of the canes were burnt it was because the stools were too high above the ground. He had never seen a field in Berbice fail to spring on this account—on the contrary the canes seemed to come up better.

Mr. F. C. Thorpe then read his paper on "Changes on Sugar Estates in British Guiana from 1865 to the present time."*

On the motion of the President a vote of thanks was accorded.

The meeting then terminated.

Meeting held August 9th.—Hon. A. Weber, Vice-President, in the chair.

Members present 13.

Elections.—*Members:* Mr. G. A. Stewart.

Associates: Messrs. Thos. H. Chatterton, J. S. Macarthur and W. A. L. Langstaff.

The following report from the Committee of Correspondence was read :—

Georgetown, August 9th, 1894.

To the President and Members of the
R. A. and C. Society.

Gentlemen,—On behalf of the Committee of Correspondence I have the honour to report that the arrangements for the Horticultural Show

* See page 205.

of the 16th inst., are virtually complete. His Excellency the Governor, has promised to open the Show at 3.30 p.m, and there is every prospect of competition in all the classes. Two sheds are already put up, and these will give more accommodation than the single shed provided last year—this is all the more necessary as there is an additional Class for Economic Products. Additional prizes for cut flowers, roses, and a single Musk Melon, are offered, and baskets for fruit and vegetables have been provided for cases where these are not put up in a manner suitable for display. These baskets may be obtained by intending exhibitors, at the Reading Room, so that a little more uniformity in the display can be produced while allowing plenty of scope for arrangement. Entries are to be made to morrow, the 10th inst., but the Committee will not refuse later entries although they would like to know what room is to be provided as soon as possible.

I have, &c.,

J. RODWAY, acting Secretary,
Committee of Correspondence.

The Revd. W. B. Ritchie, speaking as Chairman of the Committee said he hoped the members would interest themselves in the Show. Several friends outside the Society had helped the Committee, and he would especially mention Mr. Menzies, who had superintended the erection of the sheds.

The Secretary laid over the following list of awards at the Columbian Exposition, with the reasons why they were given :—

Exhibition Committee of British Guiana; Starches.—Absolutely pure, and well preserved, two of them, the Dakamabally starch (from Voucapoua Guianensis) and the Greenheart starch (from Nectandra Rodiei), are of special interest as being new to Science.

Thomas Garnett; Cacao Beans.—Exceedingly well prepared.

Exhibition Committee of British Guiana; Seventeen varieties of Fibres.—Superior strength, length, color, and general utility of the specimens exhibited.

Exhibition Committee of British Guiana; Display of Cocoanuts.—A good exhibit showing the nut in different conditions, also its products including the coir, all of which are admirably shown.

John Junor; Fibres.—Superior strength, great length and genera utility for manufacture.

Mrs. Collet; Preserved Fruits.—A large collection of preserved fruits in an excellent state of preservation and of delicious flavour, especially the pine apples, guavas and tamarinds. The last named possesses merit for its medicinal properties.

E. W. Kerr; Cassava Meal.—It is nutritious, palatable aud bears severe exposure. Combined with sugar and Chili pepper it is of great use in making bread.

Pln. *Anna Regina*; Sugar; Yellow Crystals.—Color, grain and polarization as indicated by the following relative percentages of excellence:—

Maximum.	Obtained.
25 Color	23
25 Grain	23
50 Polarization	49

Pln. *Tuschen de Vrienden*; Sugar; Yellow and White Crystals.—Color, grain and polarization, as indicated by the following relative percentages of excellence:—

Maximum.	Obtained.	
	Yellow.	*White.*
	A	B
25 Color	25	25
25 Grain	25	25
50 Polarization	48·4	48·4

Pln. *Uitvlugt*; Yellow and White Crystal Sugar.—Color, grain and polarization as indicated by the following relative percentages of excellence:—

Maximum.	Obtained.	
	A	B
25 Color	25	24
25 Grain	25	25
50 Polarization	49·5	48·5

Pln. *Vryheid's Lust*; Yellow Crystal Sugar.—Color, grain and polarization as indicated by the following relative percentages of excellence:—

Maximum.	Obtained.
25 Color	25
25 Grain	22
50 Polarization	48·5

Booker Brothers; Sugar Crystals.—Color, grain and polarization as indicated by the following relative percentages of excellence:—

Maximum.	Obtained.		
	White.	*Yellow.*	*Refined.*
25 Color	25	25	15
25 Grain	25	25	25
50 Polarization	48·6	48	46·8

Pln. *Port Mourant*; Sugar; Yellow Crystals.—Color, grain and polarization as indicated by the following relative percentages of excellence:—

Maximum.	Obtained.
25 Color	25
25 Grain	25
50 Polarization	48·4

Pln. *Perseverance*; Sugar (White Crystals).—Color, grain and polarization as indicated by the following relative percentages of excellence:—

Maximum.	Obtained.	
	Pressed.	*Loose.*
25 Color	25	25
25 Grain	20	22
50 Polarization	49	49

Colonial Company; Sugar; Yellow Crystals.—Color, grain and polarization as indicated by the following relative percentages of excellence —

Maximum.	Obtained.
25 Color	25
25 Grain	25
50 Polarization	48·7

Pln. *Skeldon*; Sugar; White Crystals.—Color, grain and polarization as indicated by the following relative percentages of excellence: —

Maximum.	Obtained.
25 Color	25
25 Grain	23
50 Polarization	49·4

L. F. Valladares; Cherry and Lemon Syrup.—Color, taste, soda test and consistency, as indicated by the following relative percentages of excellence:—

Maximum.	Obtained.	
	Lemon.	*Cherry.*
65 Color	64	64
15 Taste	14	14
10 Soda Test	10	10
10 Consistency	10	10

Scott & Co.; Crab Oil, Cocoanut Oil, Balsam Copaiba—Collection of oils and balsam showing skilful preparation.

Jacob Conrad; Crab Oil and Seeds.—Skilfully and carefully prepared.

The following letter from Mr. Jas. V. R. Swann, an Honorary Member of the Society, was also read:—

85, Perry Road, Shepherd's Bush,
London, W., England,
July 13th, 1894.

Honourable Sir,—I have the honour to forward by this post a brief statement "Imported Eggs" showing the number of Eggs imported into Great Britain, &c. This statement, partly compiled from the Russian, is one of a series of mine published in Russian, commencing with my "Domestic Industries of Russia" Department of State Washington, 1885. (Report of Acting Consul-General Swann, St. Petersburg.)

Since this statement was published I have collected and revised the data, &c. that relate to the Sterilisation of Eggs (for Export), also arranged the photo-micrographs &c., of Bacteria &c., associated with this particular and most interesting investigation. My intention is to publish this information for free distribution.

Before I return to Russia I have the promise of a small case of sterilised eggs from Russia, to prove what has already been accomplished in this direction.

Professor Volkoff writes (June 13th, 1894), "I have eaten eggs that were sterilised at Warsaw in May, 1893, and left on a shelf exposed to atmospheric influences, at ordinary temperatures until May, 1894. These eggs, covered with dust &c., notwithstanding 12 months neglect, were excellent breakfast eggs. Other eggs that had been in juxtaposition were rotten &c."

With a view to stimulate Colonial production, I am in the hope that one or two members of your Society will generously assist me to prove or disprove what has been asserted, and I respectfully request permission to place at your disposal (all charges paid) some of the Eggs I am about to receive from Russia. Your co-operation and advice will be gratefully acknowledged in the forthcoming publication and I will hasten to embody your suggestions.

I have, &c.,

JAMES V. R. SWANN.

The Honourable Secretary,
Royal Agricultural and Commercial Society,
Georgetown, Demerara.

The thanks of the Society were accorded for the communication, and the Secretary was directed to inform Mr. Swann that they would do what they could to assist in his experiments.

The following communication from the Royal Agricultural Society of England was also read, and the Secretary directed to forward the thanks of the Society for the information :—

Royal Agricultural Society of England,
12, Hanover Square, London, W.,
July 9th, 1894.

Dear Sir,—In reply to your letter of the 30th May last, I have communicated with two Members of the Council of this Society who are practical Agriculturists, conversant with Fen farming, and I have the pleasure to append below extracts from their letters dealing with the points to which you refer:

Extract from letter No. 1.

(Mr. W. Frankish, Limber Magna, Ulceby, Lincolnshire.)

"Although I live fortunately considerably above high water mark, yet it may serve your purpose to describe what I know of the fens and marshes below that level. They are very much as described in the second paragraph of the British Guiana Society's letter. The sea, of course, is banked out, and the main drainage is by large open drains; the land is intersected by other drains at various angles to suit the levels of the land, and these may form different Fields, or be sub-divided, as is found most suitable. These Fields are drained by tiles, at such depths as are found most effective, into the open drains, so that Steam cultivation does not interfere with any ditches. I do not think Steam cultivation is carried on to any great extent, and when used is mostly in the dry weather in Summer or Autumn. The round about system was first tried, but now double engines are almost entirely employed, and as a necessity, the weight of these Engines prevents much work being done at unsuitable times, say when the land is too wet. The drainage of these low lying lands is always a difficulty; but as the tide goes down twice in 24 hours, these large open drains are generally found sufficient to hold such water as may accumulate in ordinary weather; but in exceptionally wet times, such as in 1879 and some

other such seasons, these lands were to a considerable extent under water, the sluices being qutie insufficient to discharge the water in the few hours they could be made use of."

Extract from letter No. 2.

(Mr. Joseph Martin, Littleport, Isle of Ely.)

"Very little Steam cultivating or Ploughing has been done in the Fen Country, because 2 horse land is ploughed more cheaply by horses than steam. The ditches are no impediment where steam has been used, as the ropes can be worked over the drains or ditches. No implement has done more harm than the Steam Plough on the heavy land by bringing to the top the alluvial clay; and I should advise everyone to be careful in ploughing very deep on such a soil. If Steam is used, I would recommend ploughing by horses, and afterwards Steam Cultivation. I presume the surface in British Guiana is alluvial clay. In the Fen district (Cambridgeshire) the top soil is peat or moor, under which is a blue clay, about four feet from the surface. This is thrown out by manual labour, and very much improves the soil; but I do not imagine this can in any part of the world be done by Steam Ploughing: if it is at all practicable, it must be done by a sort of Steam Dredger." Trusting that the above information may be of service to you,

I am, Sir, &c.,

ERNEST CLARKE.

On the paper read before the previous meeting being declared open for discussion, the Secretary stated that Mr. Thorpe was unable to be present, and it was agreed to let the matter stand over.

Dr. H. B. Ford read a paper entitled, "What the Banana Trade has done for Jamaica."*

The Chairman in moving a vote of thanks said he hoped the discussion at the next meeting would promote the serious consideration of the matter in reference to this colony.

The Hon. Mr. Davis in seconding said that a great impulse had been given to the industry in Jamaica by direct steam navigation. He remembered reading in a

* See page 218.

Jamaica paper that subsidies were granted under the administration of Sir John P. Grant. That gentleman foresaw the advantages of regular communication, although the Jamaica papers of the time ridiculed the idea.

Mr. H. Von Ziegesar read his paper on "Diffusion *versus* Crushing."*

The Chairman moved a vote of thanks and Mr. Llewellyn Jones in seconding said the subject was a large one, and he thought Mr. Von Ziegesar's paper a valuable supplement to that which had come before the Society a short time ago.

The thanks of the Society were accorded to the Government for a copy of Mr. Crowther's report on his visit to the West Indies.

The meeting then terminated.

Meeting held September 13th.—Mr. R. G. Duncan, F.R., President, in the Chair.

Members present 11.

Elections.—*Members:* Hon. G. W. Dickson and Mr. W. B. Ebbels.

Associates: Messrs. J. W. Tucker and Robert Dodds.

The following report of the Committee of Correspondence was read:—

Georgetown, September 5th, 1894.

To the President and Members
of the R.A. & C. Society.

Gentlemen,—By direction of the Committee of Correspondence, I have the honor to submit the following report on the Horticultural Show held August 16th:—

* See page 229.

On the whole they consider this, the Second Exhibition, to have been most encouraging. The competition for some of the prizes was very keen, especially in the new class of Economic Products, where there were 12 entries for Creole coffee, 13 for cocoa and 15 for cassava meal, besides a fair number for each of the other articles. Vegetables were also well represented, peppers standing first with twenty entries, while ochros and bread fruit had respectively 17 and 16 competitors, Among the fruit, limes took the lead with 19 entries, followed by oranges with 15 and 7 (two prizes), bananas 15 and cocoanuts 14. When compared with the entries of last year these numbers are very favourable, and when we come to the whole the difference is enormous, as is shown by the following table:—

	1893.	1894.
A. Plants and Flowers	... 37	108
B. Floral Decoration	... 39	47
C. Fruit	... 74	168
D. Vegetables	... 80	172
E. Economic Products (addition in 1894)	...	84
F. Miscellaneous	... 5	17
Total entries	... 235	596

The expenses of the Show were naturally higher than on the first occasion. Anticipating an increase of the number of exhibits, two sheds were provided, and they have to thank Mr. John Menzies for his kindness in superintending their erection. These cost $281 71, and it was at first intended to sell the materials after the Show, but on consideration, the Committee decided that it would be more economical to keep them for other occasions. Advertising and printing cost $163 31, Bands of music and refreshments $119 16, Lights $135, Prize money $358 and Miscellaneous expenses $78 27, making a total of $1,135 45. On the other side the receipts for admissions amounted to $520 80 and the Government Grant $500 = $1,020 80, leaving a balance to be advanced by the Society, of $114 65. This apparent loss would have certainly been made up if the shed materials had been sold, but as these ought to be worth at least $200 to the Committee next year, they consider it better to stow them carefully.

The experience of the second Show indicates that there is every

probability of their becoming more popular each year, and also that the arrangements were by no means perfect. The Committee are of opinion that most of the exhibits should be received the day previous to the Show, and that three gates be opened in the evening and as many ticket offices provided.

Finally, they recommend that the Society again apply to the Government for a grant of Five hundred dollars, as they consider it highly desirable and beneficial to the colony that the Show be continued annually; in fact, now that a fair beginning has been made, they think it would be very unfortunate should anything occur to prevent this.

I have, &c.,

J. RODWAY, acting Secretary.

The President said the Committee deserved the best thanks of the Society for the pains they had taken with the Show; he agreed with them that it was desirable to keep the shed materials. He would therefore move that the report be adopted and that the Society apply to the Government for the sum of $500 to assist them in holding another Horticultural Exhibition in 1895.

Mr. Bellairs, in seconding the motion, said that he was of opinion that the whole of the Government grant should be awarded in prizes.

Mr. Æneas D. Mackay spoke of the difficulty in controlling the admissions in the evening, on account of the crowd, and thought that turnstiles should be procured.

The motion was carried and the Secretary directed to make application to the Government for the grant in aid.

The following reports on the awards at the Columbian Exposition were laid over for publication :—

Exhibition Committee; Canes of mixed kinds of native woods.—Excellence of a collective exhibit showing the various kinds of wood found in British Guiana and suitable for use in the manufacture of canes and similar goods.

Exhibition Committee; Portuguese Lady colonists, Artificial flowers in scales, feathers and shells.—These flowers made of fish scales, feathers

and shells, by the women of British Guiana, are artistically arranged and represent a great amount of labour and patience.

L. F. Valladares; Universal Relish.--A very delicious sauce.

Portuguese Lady colonists; Embroidery, Art Needlework.—Embroidery—different pieces of embroidery, all showing a high skill in the art. The designs are artistic. Art Needlework—a very large exhibit consisting of a number of lace handkerchiefs and yokes. The work is very good and the designs well chosen.

James Rodway; Dried Capsicums.—A dried pepper of good quality.

E. Leila; Curry Powder.—Pungent and of good flavour.

Gaskin & Co.; Chocolate; sticks, cakes and powdered.—Purity, strength and flavour of the product as exhibited in stick, cake and powdered forms.

Mrs. and Miss Waby; Necklaces of "Job's Tears."—Novelty, attractive appearance and good execution.

Mrs. Clegg; Fish Scale Work.—Well designed and constructed, showing good work.

The following communication from the U. S. Vice-Consul was read, and the Secretary was directed to forward the thanks of the Society :—

Georgetown, August 13th, 1894.

Thomas Daly, Esq., Secretary,
R. A. & C. Society.

Sir,—In reply to your letter of sometime since, touching Steam Plowing in the cultivation of Sugar under certain conditions, I now beg to enclose herewith a communication dated July 3rd 1894, and received the 12th instant, from the Louisiana Sugar Experiment Station, through the Department of State at Washington, which, it is hoped covers the information desired.

I am, &c.,

EDGAR FURBUSH,
Actg. Vice-Consul.

Louisiana Sugar Experiment Station,
Audubon Park, New Orleans, La,
July 3, 1894.

Hon. J. Spaight, Vice-Consul,
United States of America, Georgetown.

Sir,—The letter of the Hon. Thomas Daly has been referred to me by the Department of Agriculture at Washington for reply.

Permit me to say, first, that in the sugar belt of South Louisiana the soils are entirely of an alluvial character, varying from light sandy clay to very stiff, black tenacious clay; secondly, the whole area is a flat country and much of it considerably below high water mark, and hence, crevasses frequently cause destructive inundations of our crops; thirdly our drainage is mainly of open ditches crossing each other at right angles and cutting up the fields into comparatively small beds, and to some extent tile draining it, when properly done, is very efficacious and desirable. From this statement you will see that the conditions that exist here are almost identical with those that exist with you. In fact by reference to letters published some time ago in the *Louisiana Planter*, you will find a similarity of conditions pointed out by the editor of that paper. Steam Plowing is not generally carried on in the low lands of Louisiana. There are only one or two steam plows in the State and these are not continually worked. The reason given for not using steam plows is the multiplicity of ditches and the numerous delays in transferring the steam boilers and engines. Where tile draining exists, the ditches have been filled up completely and the plowing is done in both directions. As a rule, however, it may be said that on account of the proximity of the ditches on our plantations and the small area in each plat, it is considered far more economical to break with four, six and eight mule plows, than with steam engine. I must confess however, that I cannot from my past experiences form such opinions; in fact, it has been to me a wonder why these steam plows have not been long ago introduced. I shall be glad to answer any questions relative to agriculture in South Louisiana that may be propounded by the Hon. Thomas Daly.

I have, &c,

WM. C. STUBBS, M.C.H.,

Director.

A communication from the Government Secretary, covering memoranda on timbers suitable for carriage building at the Imperial Institute was referred to the Imperial Institute Committee.

A letter from R. M. Maer, Dallas, Texas, was read, and with the reply of the Secretary, taken for notification:—

The Missouri, Kansas and Texas Railway Co. of Texas,
Sealy Texas, U.S.A., July 25th, 1894.

Secretary Royal Agricultural and Commercial Society,
Demerara, British Guiana.

Dear Sir,—There is a desire amongst the people back here to leave the U.S. and hunt a country where there is a better chance for enterprise; all the natural resources of this country having passed into the hands of millionaires. We have a movement on foot to establish a colony of Americans in British Guiana or Venezuela, and will probably be able to take out 5,000 families in the first 2 years after getting a location. Will expect to engage in agriculture and manufacturing and possibly mining. We must have as an essential inducement to emigration a large tract of land in one body so our people can remain together and congenial society be assured.

It will require about all our ready capital to get there and get to work supplying our wants and if we cannot get land as a donation, would have to have it on easy terms. Would want several hundred thousand acres so as to get a variety of natural resources.

Will you please tell me, pending my trip out there in Sept. or Oct., what I could hope to accomplish in such an undertaking, your laws, conditions, &c.

Am particularly anxious to learn your laws governing corporations or organizations to hold property jointly and co-operatively.

Oblige yours, &c.

R. M. MAER.

The President said that such a settlement as proposed by Mr. Maer would undoubtedly be of benefit to the colony, and he hoped that when Mr. Maer arrived he would be able to see his way to establish it.

Dr. Ford's paper on "What the Banana Trade has done for Jamaica" having been declared open to discussion, no response was made, and the President remarked that he hoped the trade might do something for British Guiana in the near future.

Mr. H. Von Ziegezar's paper on diffusion being declared open to discussion,

Mr. Llewellyn Jones spoke of the small number of

Members present and the desirability that the paper should be freely discussed. He thought that Mr. Von Ziegesar's paper shewed some serious errors and omissions. He did not agree with the abolition of air pressure. It was true that it was unmanageable at first but now that they had it in working order, there was no difficulty. Several statements in the paper were ambiguous and he had great doubts as to the correctness of the figures. These were too favourable, and although he was as much in favour of diffusion as Mr. Von Ziegezar, he did not agree with him in giving maximum results. There was always a darker side, and it led to much disappointment when the returns were not obtained in practice. To put maximum instead of average results left the writer open to criticism. Mr. Von Ziegesar spoke of good results not being obtained for want of technical help—in Demerara this assistance had been often given with disastrous results. The colony would be helped more by the abolition of German bounties than by the introduction of German professors. From such outside interference Pln. Belair fell. It was useless to minimise the value of professional assistance, but technical training was not an universal panacea. Latterly there had been difficulties in working diffusion in Mauritius, where the Chemist had full control. There was a good plant yet it had failed. This he considered did not militate against the process, but showed the want of wise administration and good management. Mr. Von Ziegesar had spoken disparagingly of the employes on the estates, he (Mr. Jones) said, " if you cannot carry on diffusion with the old officials, don't introduce it at all.' Under wise guidance the present employes should be

able to carry on the work satisfactorily without assistance from outside. They wanted thoroughly well-informed and practical men—not persons with mere technical training. Mr. Von Ziegesar had also spoken as if Demerara was behind other countries in sugar machinery. He himself had visited a large establishment in Germany, but could find nothing of importance worth introducing into our factories. He would assert that the Demerara sugar machinery was equal to any in the world. Among the omissions in the paper the most notable was the absence of any reference to mill and diffusion juices. This he thought very remarkable as these were so important in any estimate of the value of the process.

Mr. Von Ziegesar stated that he would prepare a reply for the next meeting, and the discussion was therefore adjourned.

The thanks of the Society were accorded to the Hon. N. D. Davis for a copy of J. B. Smith's, "English Orders: whence obtained" and to Dr. T. Law Gaskin, Barbados, for 2 vols. "West Indian Civil Rights Guardian."

The meeting then terminated.

Meeting held October 11th.—Mr. R. G. Duncan, F.R., President, in the chair.

Members present 13.

Elections.—*Associates:* Messrs. Hubert Parris and H. Dupuy Gething.

The President said, before proceeding with the business of the meeting he would like to say a few words about the discussion which took place at the previous meeting on Mr. von Ziegezar's paper on Diffusion.

While strongly deprecating and objecting to anything personal, he at the same time considered that vigorous and searching criticism was desirable, and that it would tend to put more life and vigour into their proceedings if the members would study and criticise the papers, and not pass them over with a few congratulatory remarks. He made this explanation as they were all aware that remarks had been made, and that Mr. von Ziegezar had taken refuge in the public press after the discussion, and appeared hurt that he (the President) had not prevented the introduction of personalities. For anything that appeared personal he was grieved, but apart from that he approved of the most searching and even adverse criticism of the papers.

Mr. Daly said he was glad the President made this statement as he had intended to mention the matter. He agreed that papers should be criticised, but thought that Mr, Llewellyn Jones had introduced personal matter. If such were allowed it would tend to hinder the reading of papers before the Society and he hoped that in future all personal matters would be avoided.

Mr. Llewellyn Jones said he was not prepared to admit that his remarks at the previous meeting were too personal and he certainly did not intend them to be so. He did not think there was any necessity for an explanation—the colony was attacked, and with all due deference to the meeting he thought some one should have stood up to defend it. In doing this he had spoken forcibly, and while some gentlemen thought him too personal others had congratulated him on the way he had defended the colony. However severe he may have been Mr. von Ziegezar had the opportunity of reply.

The Secretary read the following communication from the Agricultural Committee, which was laid over until the next meeting :—

Georgetown, October 11, 1894.

To rhe President and Members of the
R. A. and C. Society.

Gentlemen,—By direction of the Agricultural Committee, I have the honour to lay over a copy of Prof. J. B. Harrison's report on a Standard method of examining sugars by the Polariscope. which has been adopted by the Committee as well as the Planters' Committee, and for which they request the official sanction of the Society.

I have also to report that in accordance with the Government Regulation, whereby the Committee is allowed to have articles examined and analysed by the Government Chemist free of cost, samples of diseased canes from Pln. *Reliance* have been examined, with the result that Prof. Harrison states that they are infected with Trichosphæria Sacchari, the same fungus of which so much has been written lately in the Island papers. The Committee agree with him in the opinion that this disease is by no means new, but that lately, from drought, or some other cause, it has become epidemic in the Islands.

I have, &c.,

S. R. COCHRAN,
Secretary.

A further list of the Chicago Awards was taken for notification.

British Guiana Museum—Specimens of Wood, and Drawings; A large collection of samples of the hard woods of British Guiana, prepared for Museum purposes. They show the grain, colouring and high polish to which the wood is susceptible, thus forming an interesting and instructive exhibit. The series of large water colour Drawings shows many interesting physical features of the country.

Messrs. Park & Cunningham—Canes of Letter-Wood; skilful workmanship in making and polishing, and as a superior exhibit of cane in letter-wood.

Pln. *Anna Regina* –Rum; Entire absence of deleterious matter, excellent taste and general characteristics, a good distillation, as indicated by the following relative percentages of excellence :—

	Maximum possible.	Obtained.
Purity and absence of alien matter	25	25
Distillation	25	22
Aroma and taste	25	23
Appearance and condition	25	23

M. Carreiro - Gold Nuggets ; The variety and quality of the placer gold nuggets of British Guiana; from the fine grained placer savings to nuggets weighing two ounces and over.

Exhibition Committee—Gold Ores and Minerals, mixed; especially interesting in the fact that it is an illustration of the nature of the whole auriferous region of British Guiana, an area of 60,000 square miles.

Pln. *Versailles*—Coffee, (Liberian); Clean large beans of good flavour.

The Hon N. D. Davis gave notice of motion as follows:—

"That the sum of Two Hundred Dollars be placed at the disposal of the Agricultural Committee of this Society, to be used by that Committee in experimenting as to the introduction into this colony of families of Agricultural labourers from the neighbouring British Colonies."

The Secretary read the following communication from the Government:—

From the Secretary of State to the Governor of British Guiana.

British Guiana, No. 179. Downing Street,
18th August, 1894.

Sir,—I have the honour to acknowledge the receipt of your despatches Nos. 201 and 202 of the 11th ult, transmitting copies of the Report of the Representation of British Guiana at Chicago Exhibition by Mr. J. J. Quelch, Commissioner for the Colony, and a copy of a Resolution passed by the Royal Agricultural and Commercial Society with regard to the services of Mr. Quelch in his capacity of Commissioner.

2. I have read the Report with interest, and I have received with much satisfaction the testimony of yourself and of the Society abovementioned to the valuable services of Mr. Quelch as representative of British Guiana, and to the able and satisfactory manner in which he has carried out the important duties entrusted to him.

I have, &c.,

(Sgd) RIPON.

Governor Sir C. C. Lees, K.C.M.G.,
&c., &c., &c.

The following communication from Mr. J. H. de Jonge, Consul for the Netherlands, was laid over :—

Georgetown, Demerara, 26th Sept., 1894.

R. T. A. Daly, Esq., Hony. Secretary,

Royal Agricultural & Commercial Society.

Dear Sir,—I have the honour to report that I have just received from the Legation of the Netherlands in London, the following reply on the subject of steam ploughing—London, Sept. 4th, 1894.

"Referring to your letter of May 21st, No. 22, I have the honour hereby to transmit to you, in behalf of the Hony. Secretary of the Royal Agricultural & Commercial Society of British Guiana, a report with annex, written by Iman Vanden Bosch Esq. Director of the Wilhelmina-polder in the Province of Zeeland (Netherlands) on steam culture, which report will have to be returned to this Legation in due time. The Netherlandsch Landbowcomite, on whose demand Mr. Vanden Bosch wrote it, begs to add that the steam-plough is harldly used in the Netherlands as it is not suited for the comparatively small landed properties existing there and above all as the fields are of small dimensions and mostly divided by ditches. In the Wilhelmina polder alone the steam-plough is in use."

In conclusion, I would add, that the enclosures are in the Dutch language, but that it would not be difficult for the Society to get the essay translated.

I have, &c.,

J. H. DE JONGE, Consul.

STEAM PLOUGHING ON THE WILHELMINA POLDER.

To the R. A. and Commercial Society.

In reply to your enquiries concerning Steam Ploughing, I have the honour to forward the following information :—

In regard to the fact that it is desirable to introduce Steam-Ploughing, this depends very much on the presence of different factors, and I found it better not to confine my report exclusively to answering the questions.

I therefore divide my report into the following parts :—

1. The original calculation on which Steam Ploughing was introduced in the Wilhelmina Polder.

2. The experiments which have been made with the apparatus on the same Polder.

3. The reply to the questions.

1. The reason for the application of Steam-Ploughing in the Wilhelmina Polder was to obtain the means of working the land when the usual number of horses was insufficient to turn up the heavy soil, and when to provide for this deficiency it became necessary to purchase more teams. The question was then put, would it not be preferable and more profitable, to introduce Steam-Ploughing instead of buying sixteen more horses to produce the desired result. To work out this question comparative calculations were made as regards ploughing with horses for the round-about system as well as the direct system, which was divided as follows :—

a. The "Single System" with one Locomotive, and

b. The "Double System" with two, were compared.

First, according to the "Double System." Two Locomotives of twelve horse-power each, with complete six fold ploughing apparatus, a harrow and extras, were purchased from Fowler at a cost of about 21,000 guilders.

Interest on *f*21,000 at 15 o/o	*f* 3,150
100 days, coal and oil	1,780
100 days labour, three men	450
100 days „ one man with two horses to bring water..	400
	f 5,780

100 days at 5 H.A. (Hectares) = 500, *f*5,780 *i.e.*, *f*11·56 per H.A.

Second, according to the "Single System," one locomotive of twelve horse power, complete with windlass and six-fold ploughing apparatus, a barrow &c., was purchased from Fowler for about *f*15,000.

Interest on *f*15,000 at 15 o/o	*f* 2,250
100 days, coal and oil	1,280
100 days, 3 men and 2 boys	550
100 days, 1 man with 1 horse to bring water	250
	f 4,330

100 days at 4 H.A. per day = 400, *f*4,330 *i.e.*, *f*10·42 per H.A.

Third, according to "Round-about System" of Fisher—

For this system we could use one locomotive of eight horse-power, which we had for our thrashing machine. The amount required for this is, say *f*6,100

Interest on *f*6,100 at 17 o/o	...*f*	1,037
190 days, coal and oil		800
100 days, five men		750
50 days, 1 man with 1 horse to bring water ...		125
	f	2,712

100 days at 2½ H.A. per day = 250, *f*2,712 *i.e.*, *f*10·85 per H.A.

In these calculations the implements of Fowler were taken into consideration for the first two systems, as he is the greatest manufacturer and his apparatus for Steam Ploughing is well-known and generally considered the best. For the "Round-about System" Fisher is preferred as his apparatus for this kind of Steam Ploughing is considered the best. The English calculation of 5 o/o interest on the purchase money, 5 o/o for repairs and renewing (wear and tear) and 5 o/o for depreciation is taken. For the apparatus of Fisner 2 o/o more is calculated for repairs and renewing, on account of the greater wear and tear of some of its parts such as the hempen cable and the metal channels in which it runs, this making not less than a thousand revolutions a minute. Further, it is accepted that for about a hundred days every year the Steam Plough should be used on the Polder to give a finish to the work of cultivation.

By Fisher's Steam Plough, not a hundred but fifty days are reckoned for the supply of water, as the Locomotive stops longer in one place and can be supplied from a well at one end of the field.

The number of hectares in the Polder to be ploughed every day is calculated at somewhat more than those usually given in England, because it is usual there to plough with one team of horses one acre, 4,000 yards, daily while we can do at least 6,000 yards in the same time. So, in England it is calculated that with the "Double System" between nine and ten acres can be ploughed, or about four hectares, and therefore we calculate for five. This will serve to explain the above calculations.

When we compare steam against horse ploughing, we allow that 8 teams or 16 horses should plough as much daily as an apparatus with two Locomotives on the "Double System." According to experience

and the result of statistics, &c., it is accepted that these 16 horses cost yearly per team, for food, keeping hire of servant, interest on purchase money and wear and tear of harness and implements of husbandry, and depreciation, *f*650; ploughing then according to the above calculation, of five hectares daily or 500 annually, costs *f*5,200. Thus the plough work of the horses amounts to *f*10.40 per hectare against *f*11.56, *f*10.82 and *f*10.85 respectively by the different systems of Steam-Ploughing. From this it appears the work of horses is somewhat cheaper than Steam Ploughing--it will appear later that this difference is very great.

The introduction of the Steam Plough into the Wilhelmina Polder was not altogether a question of expense, but the recommendation was based on some benefits likely to accrue from the better cultivation obtained by steam than by horses. These advantages were the consideration estimated to result from the introduction of Steam Ploughing into the Polder, and were as follows:—

The steam plough works quicker and better than horses; better above everything else from the fact that the ground is not trodden, which, especially in a wet season in the autumn, is a great advantage to the land. Again, with the larger steam implement a more powerful agent is available to plough with advantage to greater depths than are otherwise attainable, and also to plough in summer even if the land should be caked so hard by drought as to make its working impossible by horses. Further, the steam horse is never tired; we possess an apparatus that requires no rest, and can be fed while working; thus the working day can be lengthened by a fourth or more, and the ploughing of a hundred days be done in seventy five. For example, if the time is too short to work the field properly after the crop and before the winter sowing, then the benefit derived from the work being done with greater speed and in less time is great enough to be appreciated. Not only does the work take longer when done by horses, but by sudden showers the best time for working is often lost. Then, with Steam Ploughing, especially under the "Double System," we require fewer hands and have therefore less to do with all sorts of servants and labourers. Along the track of the engines we can also draw heavy loads of mangles, sugar beets, potatoes and earth from the field, when, for example, after a long drought it is not possible to do so otherwise without injury to the soil. In such cases the steam appliances are put on the tracks and waggons, made by Fowler for the purpose

and drawn by the metal cable. These waggons hold 4,000 to 6,000 (kilos) K.G. and one of the Locomotives can draw a load of at least 20,000 kilos; they are already largely in use for the transport of coals, &c Also, one of the Locomotives can be used to drive the thrashing machine. Finally, we have with the Steam Plough no fear of sickness or death among the horses.

Taking into consideration all the advantages of the Steam Plough over horses, we have in the Wilhelmina Polder followed the example of the English in deciding to buy a steam apparatus instead of sixteen horses, to do work which could not be properly done by the latter.

Of the different systems (the Round-about and two machine) which we have in Steam-ploughing, we have taken the "Double System" of John Fowler of Leeds by preference, and although it is the most expensive at the outset it is cheapest in the end.

First, it is best because there are no cable carriers, pulleys nor chains required, and therefore it gives very little trouble, and

Second, the very easy way of removing it from one field to another, which is done quickly without help, as the steam engine draws along everything, through which we can work more land per day than by any other system.

2. Our experience in the Polder for twenty years (1874-1894) under the operation of Steam-Ploughing considered with regard to the expected benefits on which the introduction was based.

At the beginning it was intended to use the Steam apparatus or Steam Plough, and in the first year (at the beginning of 1873) it arrived on the Polder from England. A start was at once made so as to do away with horses, and with the disappearance of the mud the apparatus went farther down to the subsoil so that the nine-toothed extirpator and the turning cultivator could be used, these being almost exclusively used in later years and the plough but seldom, we therefore can say little of that implement.

The time when the plough was to be used was the autumn to turn over the winter furrow. If the land was heavy, which was to be expected in the autumn, especially in the climate we have here, it was impossible to go to the usual depth of 25 centimetres, with six ploughs, as they were too heavy for the engines, and therefore two were removed and we worked with four.

The number of hectares per day was therefore reduced and beyond this the working was not so satisfactory and was worse than by horses,

especially when the soil caked. The depth was less and there was difficulty in the steering and therefore the furrows were not of the same width.

If the land is very wet it is no use to talk of ploughing, as the locomotives sink into the ground and cannot be moved, only going deeper and deeper instead of moving forward. In such cases we have to do away with the Steam Plough to a great extent or work it when the ground is hard. And then again by using horses we have to put up with the spoiling of the ground by their trampling.

The rails are 82 centimetres broad, which the locomotive leaves embedded in the soil behind by its weight (15,000 kilo.)

If the ground is very hard and has not yet been worked, then the ploughing is very difficult, not because the plough doesn't go deep enough, but because it does not run even but goes deeper in one place than in another and rebounds from hard places without entering.

In the autumn the Steam Plough can do good service, and the advantages we have from it above cultivation by horses is that it goes quicker and therefore we can work the whole day. If the harvest is not too late then we see its use, otherwise horses are quite capable of doing the work. Fowler has, however, lately brought the implement to such a state of perfection that it is more successful than horse-ploughing. There are also many new models which deviate very much from that we have, which is the first, and therefore of the oldest construction.

On the fallow in the summer, which has already been worked by horses and where we wish to plough deeper, then the Steam Plough is best.

If we desire but little more from the Plough than to break up rough land, even if we get large clods, and where there is no bottom (which in the rainy seasons is very bad, and allows the implement to sink) the Steam Plough is put on dry ground and will then produce the desired effect when it would be almost impossible with horses.

In California ploughing by steam in the wheat district is carried on with great success, first, because the fields are so large that enough horses cannot be obtained, and second, because the ground is hard and dry, there being no rain from May to October.

We give a few figures of the twenty years working, by which it is shewn that the Steam Plough has been working about 67 days per year, the average being about 58 hectares per year and about 2.7 per day. By these figures the cost is different from that already given, being

*f*11.56 per hectare. During the last fifteen years the cost of coals, oil and labour and horses to bring water and coals, averaged about *f*7.09 per hectare, to which must be added the cost of repairs and interest on capital 15 o/o on *f*22,000. The more we plough each year the less becomes the expense per hectare, and taking into consideration that the plough worked only about 58 days per year, this brings the expenses higher, making them about *f*17·50 per hectare. The Steam ploughing cost during the twenty years *f*24·14 per hectare, and to do the same work with horses only *f*10·50. Thus the Steam ploughing cost double and no better work was obtained. From this we come to the conclusion that the introduction of steam ploughing implements was not profitable.

There is however one implement, the extirpator, or as the English call it, the Turning Cultivator, the work of which cannot be done by horses, and which cannot be too highly praised. This is already in use, not on the score of cheapness, but specially for quicker and better work. *This quicker and better work leads to better results and this is the main advantage over working by the Steam Plough.*

Just after harvest when the horses are engaged in carting and it would be impossible to use them for cultivation, the extirpator can be utilised. As soon as the crop is taken off we can go on with the Steam Cultivation while the horses are yet employed in the harvest work, and break up the ground however hard it may be. We all know what a great advantage this is in a very dry season or where it is choked with couch grass, as it exposes the roots to the sun until they wither.

If we desire to get any benefit from the short duration of the hot weather we must be quick about it and the extirpator is set to work and will turn up a field of 8 hectares in one day at the same time drawing out the couch grass. The steam harrow or horse harrow further draws out the grass roots so that they get more exposed and dry all the quicker. If we wish to make the ground more loose we use the 9 or 11 toothed extirpator which goes through it like a comb and does better work and work which is impossible by the other implement, especially when we can work both ways. The work of the horse cultivator has proved of great advantage as the same work was not done by any other implement, but the Steam extirpator by its greater power and the quickness with which it does the work is undoubtedly the best, although expensive to work, and we could not dispense with it.

If the land becomes lumpy then we have to abandon the extirpator,

especially in unmanageable clay where the soil remains sticking to the teeth of the implement, fortunately, however, the time of working the fallow, starting in May, and the preparation of land, for carraway seed, etc., is the best in the year for the purpose.

I give a few figures of the Steam cultivator, which show that in about a year we worked 267·3 hectares, an average of 6·24 per day, the cost of which was *f*10 41 per hectare; in future the cost will probably be less. By using horses the expenses would be about the same as for ploughing, *i.e.*, *f*10·50.

Of the other implements the steam harrow is at present the only one in use, and that but seldom, because the horse harrow does the required work quite as well. For 79 hectares or 11 per day, the cost is *f*5 86 per hectare. With horses it costs only *f*2 per hectare, but we can scarcely compare the two cultivations, as what can be done by the Steam harrow is hardly possible with horses, from which we can see that the steam implement is more advisable.

I hope I have been plain enough in explaining the difficulties of the Steam ploughing implement and what are the reasons for its use on the Wilhelmina Polder—especially the use of the turning cultivator. We may state that the Steam Plough is worked on the Wilhelmina Polder but we more especially use the extirpator. If we wish to introduce Steam ploughing it must only be in places where the areas are large. It can only be used on farms of at least 1,000 hectares, and which are divided into very large fields. In the Polder the fields are 8 to 10 hectares, and to work the same profitably, we require a length of at least 300 metres, otherwise too much is lost by the turning. The unmanageable clay—I mean the clay which cakes into hard lumps in the summer and becomes a slough in the winter—requires broad hard gravel paths and strong conduits. Working with narrow paths is very difficult, especially in the rainy season, as it is quite impossible to keep the locomotives on them and they often slip into the ditches. If the weather is not too changeable and the dry season lasts, the work can be done much better. In such a wet season as that of 1879, the profits were small.

In the English letter mention was made of land divided into small beds on account of drainage by open ditches crossing each other. On such land we require a locomotive of 12 horse power, which must have a road of 3·10 metres and a cultivator of 2·08 metres (now 2·68) broad, quite impracticable in use as the plan will shew, unless we work only in one way.

In the Wilhelmina Polder the land is very dry although it belongs to the low lands of our country. In California they have gone back to the first idea of making the steam engines of use generally. I said already that the Locomotive goes over the field, drawing loaded waggons, and that these are quite different from those of Fowler. The wheels are not so broad and are much higher, while the boilers are built lighter but are still very powerful as compared with horses. It is astonishing to see how quickly you can go over the land even if the soil is heavy. In polder land such as ours, however, the Californian system would be unworkable. In California we used the plough and extirpator more on the back lands, and the same apparatus was utilised to gather the corn by means of a Combined Harvester, which cut and dried it at once to the extent of 11 hectares per day, and put it in bags; it is set in motion by usingst raw in the furnace.

IMAN G. J. VANDEN BOSCH.

Wilhelmina Polder,
10th July, 1894.

The Secretary was directed to thank Mr. de Jonge and also to forward the thanks of the Society to the writer of the paper on Steam Ploughing (Mr. Vanden Bosch.)

The President said he would like to draw the attention of the planting Members of the Society to the work of the indentured immigrants. Every able-bodied immigrant, under indenture, was supposed to perform in the course of a year about 300 tasks, but owing to sickness, absence with or without leave, desertion, &c., a great number of them did not perform fifty per cent. of the work that could be legally claimed. He thought the matter one that ought to be taken up and considered by the Society. Those in charge of estates ought to do away with some of this absence with or without leave, and try to get more work from their people. It would be better for the immigrants, better for the estates, and better for the colony, that the legal number of tasks should be performed, and he mentioned it that

some of the planting members might give it some consideration, and if they could lay over statistics of the number of tasks performed, and of those lost to the estate, and the reasons why these latter had not been performed, it would be very interesting.

The Secretary read the following communication from J. T. Quigley, Galveston, Texas, and stated that in reply he had forwarded a copy of the "Handbook of British Guiana," and stated that he would be happy to supply any special information.

Galveston, Texas, U.S.A.,
August 20th, 1894.

Secretary Royal Agricultural & Commercial Society,
of British Guiana, Georgetown.

Dear Sir,—On behalf of a small number of English-speaking agriculturists who contemplate locating in a tropical country, and who are favorably impressed with what they have heard of British Guiana, I beg to ask (in case such action is customary and might be deemed mutually beneficial) that you kindly furnish me with a little of such information regarding the country and its inducements as you might consider useful to intending settlers of this class.

Very respectfully yours,
J. T. QUIGLEY.

Mr. W. T. Binnie read his paper on "Our Provision Supply,"* for which a vote of thanks was accorded, and the discussion left over until the following meeting.

The thanks of the Society were accorded for the following donations :—

From the President—4 reports on the West Coast Sea Defences.

From Mr. E. H. G. Dalton—Lanzi's History of Painting, 3 vols.; Schlegel's Dramatic Literature and Philosophy of History.

The meeting then terminated.

* See page 261.

Meeting held November 15th.—Mr. R. G. Duncan, F.R., President, in the Chair.

Members present 10.

Elections.—*Members:* Messrs. Wastel Bull, Leslie T. Le Mare and the Hon. Cavendish Boyle.

Associates: Messrs. J. C. Bryden, W. G. Chapman, A. Hurley, J. E. Brandon, H. W. Fuge, and Edwin Futty.

The Chairman of the Agricultural Committee (Hon. B. Howell Jones) read the following report on the papers sent in competition for the Caramel Premium :—

REPORT OF THE JUDGES ON THE COMPETITIVE ESSAYS ON THE MANUFACTURE OF CARAMEL FOR THE COLOURING OF SPIRITS.

Seven essays only have been sent in, in competition for the premium of two hundred dollars offered by the Royal Agricultural and Commercial Society, for an improved way of producing Caramel,--combined with its economical manufacture –for colouring rum for market and producing the least degree of obscuration, and these have received careful consideration by the Judges appointed by the Agricultural Committee,

We are unanimous in considering that the results of the competition are most unsatisfactory, both with regard to the small number of competitors and to the merits of the essays sent in.

In our opinion none of the essays contain anything of value beyond what is already of common knowledge, or even any addition to our present knowledge of the best methods of preparing Caramel for colouring spirits.

We therefore, cannot recommend the award of the premium to any one of the competitors, and in view of the lack of interest evoked by the competition, consider it unadvisable to, in the immediate future, again offer a premium in connection with this subject.

We cannot refrain from expressing our astonishment and regret that none of the technical sugar chemists and experts resident in the colony sent in essays for competition. We are satisfied that if these gentlemen had competed that important additions to the general present knowledge of the best methods of preparing Caramel for the purpose of colouring spirits would have resulted from the offer of the award.

In addition to the essays, two preparations were also submitted for competition, but were not within the lines of the award. One of these, "Melline," was itself barely as dark as really good coloured Demerara rum, and was therefore quite useless for the required purpose, whilst its high price was quite prohibitory to its use. The other, "Spirit Colouring," prepared by Messrs. A. Boake, Roberts & Co., of London, whilst found to be capable of colouring rum of 45 O.P., to a full colour, with an obscuration of only two per cent, produced a cloudy rum, which required a long time for its clearing.

B. HOWELL JONES,
Chairman of Agri. Committee.
J. B. HARRISON,
Government Analyst.
H. R. L. VON ZIEGEZAR,
Agricultural and Analytical Chemist.

The Hon. N. D. Davis, in moving the adoption of the report, said that it was satisfactory to learn that as much was known in this colony about Caramel as in any other. There was no doubt however that some estates' managers had knowledge which others had not and he thought it was desirable that this knowledge should be communicated to the planters generally. It was he thought very unsatisfactory that no chemist had competed, and he understood that the preparation of colouring was considered by some as a trade secret.

Mr. Llewellyn Jones in seconding the adoption of the report, asked whether the competition had been open to scientists outside the colony.

The President in reply said that it was open to the whole world. The information had been circulated in all sugar-growing countries. He thought they had to thank the Agricultural Committee for the trouble they had taken. As to the preparation of Caramel being a secret, this was not the case. It was prepared in the same way all over the colony, but as it was done by

" rule of thumb," it was not uniform. The trouble had, he thought, been brought about by persons interested in the sale of a particular colouring. At present, however, scarcely any rum left the colony with a very high obscuration, as by care and attention they could always keep below three per cent.

The Hon. Mr. Howell Jones stated that virtually all the essays had been sent from other parts of the world, and he agreed with the President that there was no secret in the preparation.

The report was adopted.

The Secretary read the following report from the Agricultural Committee :—

Georgetown, Novr. 14th, 1894.

To the President and Members,
of the R. A. and C. Society.

Gentlemen,—By direction of the Agricultural Committee, and in accordance with the Government Regulations for free analyses by the Government Chemist, I have the honour to report that specimens of diseased canes from Pln. Windsor Forest have been examined. These canes were taken from three fields where five per cent. of the crop was either dying or dead, the remainder being apparently healthy, and Mr. R. G. Duncan stated that he had ordered the fields to be reaped at once, although the canes were not ripe, and the trash to be burnt. Prof, Harrison reports that the damage was done by the moth borer and that the canes were also much affected by rind fungus.

I have, &c.,

S. R. COCHRAN,
Secretary, Agricultural Committee.

The President stated that the canes referred to had been sent by him to Prof. Harrision. They were attacked by the same fungus that had done so much damage in Barbados. Fortunately the disease had not become epidemic here, although it had been found on several

estates, and he hoped they would not have much of it to add to their other troubles.

The Hon. Mr. Davis said he had heard from St. Kitts that they were much troubled there with the borer, which they attributed to the fact that lizards had become scarce from having been eaten by the Mongoose.

The Hon. Mr. Jones stated that it was Prof. Harrison's opinion that the fungus was always the result of the borer, and that it was no new disease. The matter need not alarm the people here as they could always get rid of it by inundating their fields.

The Secretary laid over the following reasons for awards at Chicago :—

B. H. Jones ; Rice.—Ten varieties of plump dark grain, in husk and stalk ; of educational value as illustrating the resources of the country.

S. R. Cochran; Rice.—Several varieties, including white and black, in the hull and cleaned, all of good quality.

A. R. Gilzean ; Rice.—Large collection of the different varieties of native rice, clean, in the hull, and in the husk. The white variety is excellent in quality, being a large plump grain and well filled. The small sized variety yields three crops annually and averages about one ton per acre.

L. M. Hill ; Road Material (six boxes).—The good quality of materials and the advancement shewn by a comparatively young country.

The exhibit consists of one box of sea sand, one box of white sand, one box of burnt clay, and three boxes of different kinds of granite. These materials are used in building the roads in and around the towns in British Guiana and also along the sea shore, Previously the granite with sea sands was used to build these roads, but at the present time the burnt clay is largely in favour. The clay is pressed together by the road roller and the so created smaller parts and dust, form, with moisture, which is contained in and attracted from atmosphere, a kind of connection, so that the surface of such roads appear as if cemented.

Pln. *Rose Hall ;* Coloured Rum.—Perfect purity, good aroma and

taste, excellent distillation and good general characteristics, as indicated by the following relative percentages of excellence.

Maximum possible.		Coloured Rum.
25	Purity and absence of alien matter	25
25	Distillation	23
25	Aroma (bouquet, flavour) and taste	22
25	Appearance and condition	22

Pln. *Versailles*—White Rum; Absolute purity, excellent general characteristics, good aroma and taste, as indicated by the following percentages:—

Maximum possible.		Coloured Rum.
25	Purity	25
25	Distillation	22
25	Aroma and taste	23
25	Appearance	24

Pln. *La Bonne Intention*—White Rum; Perfect purity, good aroma and taste, good distillation and general characteristics, as shown by the following relative percentages of excellence:—

Maximum possible.		Coloured Rum.
25	Purity	25
25	Distillation	22
25	Aroma and taste	22
25	Appearance	22

Pln. *Nismes*—White Rum; Entire absence of deleterious matter, good taste and distillation, and excellent general characteristics, as indicated by the following relative percentages of excellence:—

Maximum possible.		Coloured Rum.
25	Purity	25
25	Distillation	22
25	Aroma and taste	22
25	Appearance	23

Exhibition Committee; Collection of Commercial Woods.—1. For a good display of native commercial woods in large sizes; 2, for showing their application in the arts; 3, for giving a comprehensive view of the forest resources of the colony.

Exhibition Committee; Yellow Dent India Corn.—Ears not long but large and well filled with a deep kernel; small cob. Three and four crops can be raised annually. Average temperature 80°, rainfall 85 inches.

The Hon. N. D. Davis brought forward his motion, of which due notice had been given, for $200 to be placed in the hands of the Agricultural Committee to carry out an experiment in the introduction of families of agricultural labourers. In introducing his motion he stated that up to and including the present year, the colony had spent about £4,600,000 on immigration since the abolition of slavery, and still they had no regular labour supply. It was certain that in the present condition of things the colony could not afford to continue the importation of labourers to the number of four or five thousand every year. By immigration they had increased the population of the colony from 100,000 to nearly 290,000, at a cost of about £30 a head. East Indians did not settle here to any great extent nor did the people from the Islands, probably because their families were left behind. He would suggest as a commencement that the Agricultural Committee should find out what agricultural labourers on the plantations here had families in the Islands, and whether they would like them to be brought over at the Society's expense.

Mr. Daly in seconding the motion said he thought the amount was too small for the experiment.

The Hon. Mr. Jones also said the amount was too small and that it was a matter for the Government rather than the Society. In fact it had already been under the consideration of the Government, who had obtained the opinion of the Planter's Association, with certain recommendations. Attempts had also been made by individual enterprise with the result that some families were already located on estates. The Society had over and over again recommended the

introduction of families from the Islands but the difficulty was that they would not come to stay, but as they made a little money, looked to go back.

The President said he was in favour of the principle of the motion but did not think the funds of the Society should be spent in such a way, they might however ask the Government to allow them a grant for such an experiment. The Barbadians could not be got to remain; they came and went, getting home-sick as soon as they had a little money saved. Some were so pleased with an estate that they returned to it after a visit to Barbados but they would not settle down altogether. If they introduced 5,000, two-fifths of them would go away by the end of the year. In regard to what he said at the last meeting about indentured immigrants performing such few tasks, this was greatly due to the action of certain officials in making themselves counsel for them; this prevented necessary discipline, and nothing but a vagrancy law would prevent it. He was well within the mark in saying that the labourers in the villages worked only 150 days in a year. He thought that great credit was due to Mr. Davis for the interest he took in this matter and he would vote for a motion to ask the Government for $1,000 to try the experiment.

The Hon. Mr. Davis said his object in bringing forward the motion was to find out whether it would work or not, and he would have asked for a report on the result. However, as he saw that the feeling of the members was against the spending of the money of the Society on the experiment, he would withdraw it with consent of his seconder.

This having been given the motion was withdrawn.

No discussion took place on the two papers read at the previous meeting—"Steam Ploughing" and "Our Provision Supply."

The meeting then terminated.

Meeting held Decr. 20th.—Mr. R. G. Duncan, F.R., President in the chair.

Members present 19.

The Secretary laid over a communication from the Government asking the opinion of the Society as to the probability of there being any exhibits from the Colony at the coming Exhibition of Photography at the Imperial Institute, which was referred to the Directors for their consideration.

The President then addressed the meeting as follows :—

PRESIDENT'S VALEDICTORY ADDRESS.

Gentlemen, a year has passed away, since you conferred on me the esteemed honour of electing me President of this Society, and it is my duty to-day, before vacating the President's chair, to refer briefly to matters of interest in connection with the proceedings of the Society during the year now drawing to a close. I consider the Royal Agricultural and Commercial Society the most important Society in British Guiana—a society which, if it fulfils the object for which it was founded, ought to leave some footprints on the sands of time, in connection with the history of the progress and development of this Colony. But unfortunately a great lack of interest is displayed on the part of those most deeply concerned, viz., the Agricultural and Commercial community. During the current year many papers have been read on Agricultural subjects, but those members of the Society who are connected with agriculture have been conspicuous by their absence from the meetings. This is a terrible Colony for allowing things to "drift;" you will observe that any stir made in matters agricultural, commercial, or political, is at the instance of one or two individuals, the majority of those interested waiting to reap the benefits of the success, or to criticize freely the results of a failure The same thing applies more or less to every community, but it is

especially noticeable in British Guiana, and must I fear, along with many other shortcomings be charged to the enervating effects of our climate. All the more credit is therefore due to those gentlemen who prepared papers, attended the meetings, took part in the discussions, and in this way kept alive some interest in a society whose aim and object deserves the support of every intelligent member of the community. It is certainly very desirable that members of the Agricultural and Commercial community should meet together for the interchange of ideas and the discussions of important questions affecting their welfare, but unfortunately there is a conservatism amongst them, which is antagonistic to their general welfare, and each individual prefers to work out his own salvation in his own way, if I may so express it. It is quite true the Chamber of Commerce and the Planters' Association each occupy a small corner of the field, but they leave a wide area available for the work and usefulness of this Society. The R. A. and C. Society was founded with the view of promoting in every possible way the Agricultural and Commercial prosperity of the Colony, and it is within my province as President, nay more, it seems to be my duty, to refer to the depressed condition of our chief industry at the present time. You are all doubtless aware that the market value of sugar is now less than the cost of its production, and the sugar industry, on which the well-being and prosperity of this Colony depends, is in a wavering condition. This state of depression has been brought about chiefly by overproduction. Witness the enormous output of beet sugar on the continent of Europe, stimulated by export bounties, and safeguarded as regards home consumption by protective duties. It looks as if the sugar industry would give a great object lesson regarding the "survival of the fittest," and yet it could not be regarded as the survival of the fittest if the industry succumbs in countries possessing the best natural resources for cheap production, beaten in the unequal fight by countries where sugar can only be produced at a profit if largely protected and state-aided. Take Louisiana for instance, where severe frosts occur, and only during a limited portion of each year can canes be grown. That country is now protected by a duty of 40 per cent. levied on the value of all raw sugars imported into the United States, and yet at present prices, the industry in Louisiana is languishing and unprofitable. But, if a tropical country such as ours, with every natural advantage for the growth of the sugar cane should go down before a country such as Louisiana, it could not

in any sense be said that the fittest had survived, but rather that the sugar industry had survived in that country where the Government considered it most advisable in the interest of the people it should be maintained. Again, in beet sugar growing countries on the continent of Europe, bounties are paid on all sugars exported, whilst heavy import duties shut out all foreign sugar from competition in the markets, and French and German sugar is about treble the price in Paris and Berlin that it is in London. Under existing conditions the English sugar growing colonies have in every country to meet heavy duties on sugar, except in England, and there they have to compete with sugar cheapened by bounties, the Russian beet sugar manufacturers actually binding themselves not to sell more than a certain quantity of sugar annually in Russia, so as to maintain the local price, the balance, at whatever loss, they export to the only free dumping ground in the world, viz., England. So that it is no wonder if we faint and grow weary in the race, seeing our competitors favoured by our Mother Country, England, whose interests in her Colonies should surely be paramount to the benefit she derives by getting for a time cheap sugar, at the cost of the continental labourer and taxpayer. The sugar industry in this Colony has also been heavily handicapped by the indolence of our peasantry, and to this fact also will to some extent be attributable the result, should the present wave of depression completely swamp us. There are notable exceptions, some of our peasantry being industrious, steady, persevering men, but the great majority of them are indolent and unreliable. The labour available in this Colony, would have easily produced all the exports that have ever left our shores, without the assistance of a single coolie, and yet we all know that, had coolie labour not been procured, the sugar industry would probably have disappeared from our midst long years ago. It is absolutely necessary for the continuance of the industry in this Colony, that labour should be certain and cheap. We compete in sugar growing against countries such as France and Germany, where every labourer in good health can be relied on for six days' work per week, and where the average wages paid to field hands would be equivalent to about 24 cents per day. We may not enforce a vagrancy law to save our peasantry from the evil results of their own indolence, but the Government, the Clergymen, the Schoolmasters, and the more intelligent of our peasantry, should use every endeavour to impress upon our labourer the value and the necessity of steady industrious habits, and the fact that during the

present struggle for existence on the part of our sugar industry they may have to work six days to earn what in more prosperous times they could easily do in three. Gentlemen, we all hope and believe there is a silver lining to every cloud, and that although all looks dark at present, the dawn of a brighter outlook for our staple industry may be near at hand. But when this dawn arises we must not stand still; satisfied with things as they are. If we do so other countries will be pushing ahead and adopting every device and assistance to enable them to produce sugar cheaper, and when a severe period of depression comes again, as come in the natural course of events it must, we shall be inevitably crushed out. From my point of view it appears certain that large central factories, capable of manufacturing not less than 20,000 tons of sugar per annum, must be erected, the interest on capital necessary being guaranteed by Government for a certain period, as has been done in other countries, and notably recently in Queensland. Such factories, complete with the most modern and approved appliances, would extract more sugar from the cane than can be done at present, for a lower expenditure on labour, fuel, salaries, &c., and would be able to pay the cane grower a much higher price for his canes than what their present value represents to him. The agricultural and manufacturing operations would then be entirely separated, and people with small capital would be in a position to grow canes and sell them to the central factory at a price agreed upon, and regulated by the market value of sugar. The proposed factories should belong to Limited Liability Companies, and the cane grower should be given the opportunity of becoming a shareholder in them. If a properly equipped central factory could, in addition to extracting more sugar from the canes, produce sugar for an outlay of £1 per ton less than is done in a well-arranged Demerara Factory to-day—and this, I assure you, is well within the mark—it would pay a very handsome dividend on the capital necessary for its erection. But, gentlemen, I have digressed considerably from the mere review of the Society's affairs during the year now closing, and with your permission, will now return to that subject. The Society's roll of members shows an increase of five, there being 535 on the roll as against 530 on January 1st, the losses by death, resignation, departure from the Colony and non-payment of subscriptions being 91, and the new additions 96. Among those who have died, I may especially mention: A. Barr, L. B. K. Collins and M. R. O'Maley, whilst amongst

those who have departed our shores to enjoy a well earned retirement in the mother land, are to be found the names of Sir D. P. Chalmers, and Dr. R. Grieve. The usual number of general meetings were held during the year, and the following interesting papers were read :—"The maintenance of roads and bridges" by Mr. T. N. King; "A few popular facts about diffusion" by Mr. L. Jones; "Open drainage and steam Husbandry" by the Hon. E. C. Luard; "Some effects of the late Rainfalls" by Mr. J. Gillespie; "Some enemies of our cane fields" by Mr. S. R. Cochran; "Cost of sugar production" by the President; "Changes on sugar estates since 1865" by Mr. F. C. Thorpe; "What the banana trade has done for Jamaica" by Dr. H. B. Ford; "Diffusion *versus* Crushing" by Mr. H. von Ziegesar, and "Our Provision Supply" by Mr. W. T. Binnie. Among other important matters discussed at the meetings was a premium for improvements in the manufacture of caramel, offered on the motion of the Hon. N. D. Davis, and answers to questions on steam ploughing sent by the Society to England, Louisiana and the Netherlands. A premium of $50 was awarded in January to Messrs. Da Silva Bros. of the Pomeroon for establishing the kiln drying of Indian corn. The jubilee of the Society was celebrated on the 27th March with a historical exhibition and a conversazione, both of which were well attended and thoroughly appreciated by members and their friends. The horticultural show took place on the 16th of August, and was very successful. This show can now be held annually as it is established on a sound basis. The library has been increased by the addition of about 600 volumes. A new gallery to afford increased accommodation has been erected, and for superintending the erection of this gallery and other improvements to the buildings the thanks of the Society are due to Mr. Conyers. The Museum has received important accessions by the return of the specimens mounted for Chicago. As continual additions are made the want of room becomes more apparent every year. With regard to *Timehri* I may say it continues to maintain its high standard of excellence, and you are all aware its Editor, Mr. Rodway, wields the pen of a ready and elegant writer. In conclusion, I have to thank you all for your courtesy towards me during my term as President, and the Hon. Secretary, Hon. Treasurer and the Assistant Secretary and Librarian, for the able and willing assistance they have afforded me. It has been the privilege of the retiring President to submit for the approval of the members the name of the gentleman suggested as his successor, and I have much pleasure in proposing

that the Hon. E. C. Luard, be elected President for 1895. He is a gentleman well known to most of you, a leading member of the community in matters agricultural, and I am confident will make a worthy and useful President.

Mr. Kirke in seconding the nomination of the Hon. E. C. Luard as President, said they had to thank the Chairman for his excellent address. He would however like to mention one thing in connection with his remarks on the position of the British Government towards this colony. They must all be aware that the Government was now controlled by the masses, whose idea was to get as high wages as possible and at the same time obtain every food product at the lowest price. It would therefore be useless for them to expect the Government to do anything to raise the cost of such an article as sugar. In reference to Mr. Luard's qualifications for the office of President of the Society, he would notice one not mentioned by the Chairman; that he was a resident proprietor.

The Hon. Mr. Luard having been unanimously elected, he thanked the Chairman for his remarks both general and personal. Mr. Duncan, he said, had been a model President—one who spared neither pains nor trouble to infuse vigour into the Society. He would move a hearty vote of thanks to him for his great services during the year.

Mr. Jacob Conrad seconded the vote of thanks, at the same time remarking that without disparagement to the new Presdent, he regretted that they could not elect Mr. Duncan a second time. He would also like to have the other Office-Bearers associated with the President in the vote of thanks.

The Hon. N. D. Davis supported, and the vote of thanks was carried with acclamation.

The President thanked the members for their expressions towards him and said he hoped that there would be a larger attendance at the meetings in future. With over five hundred members he thought it strange that little more than a dozen could be got to attend regularly.

On the motion of Mr. S. R. Cochran, seconded by Mr. Æneas D. Mackay, Mr, R. G. Duncan was elected Vice-President.

The Ordinary, Managing and Exchange Room Directors were then elected, after which the President in a few highly complimentary expressions proposed that Mr. Conyers be retained as Honorary Treasurer, which was carried with acclamation. Mr. Thomas Daly was also re-elected and the various Committees as per following list (see over) :—

In connection with the Resident Director in London, Mr. Luke M. Hill asked if Mr. Nevile Lubbock could not look after the exhibits at the Imperial Institute?

The President in reply, said they had a Committee for that purpose, but although the matter was under consideration it had not yet been arranged. It was probable that the Government would be asked to grant a small amount for a Curator, but he did not think the Resident Director could do the work.

Mr. Æneas D. Mackay asked permission to have copies of the papers in connection with corn drying in the United States, obtained some years ago through Major Walthall, which was granted.

The meeting them terminated.

Office-Bearers for 1895.

Patroness

THE QUEEN.

Vice-Patron:

HIS EXCELLENCY SIR CHARLES CAMERON LEES, K.C.M.G., GOVERNOR AND COMMANDER-IN-CHIEF, &c., &c., &c.

President:

HON. E. C. LUARD

Vice-President:

R. G. DUNCAN, F.R.

Hon. Secretary:

THOMAS DALY

Hon. Treasurer:

F. A. CONYERS

Ordinary Directors:

S. R. COCHRAN
HON. B. H. JONES
GEO. H. HAWTAYNE, C.M.G., F.R.G.S.
LUKE M. HILL, C.E., A.M.I.C.E.
H. KIRKE, M.A., B.C.L.
HON. A. WEBER

Managing Directors:

HON. N. D. DAVIS, C.M.G.
GEO. GARNETT, F.R.
PROF. J. B. HARRISON, M.A., F.I.C., F.G.S

Exchange Room Directors:

T. H. GLENNIE
FERRIS GRANT
C. WIETING

Agricultural Committee:

Chairman: HON. B. H. JONES
Vice-Chairman: PROF. J. B. HARRISON, M.A., F.I.C., F.G.S.
Hon. Secretary: S. R. COCHRAN

ROBT. ALLAN
GEO. BAGOT
S. M. BELLAIRS
G. M. BETHUNE
W. T. BINNIE
JACOB CONRAD
R. G. DUNCAN, F.R.
J. M. FLEMING, M.A.
H. GARNETT
J. GILLESPIE
HON. A. R. GILZEAN
LLEWELLYN JONES
HON. E. C. LUARD
W. S. MARR
J. B. MAYERS
W. R. SPENCE
HON. W. A. WOLSELEY
H. VON ZIEGESAR

Commercial Committee:

Chairman: J. H. DE JONGE
Vice-Chairman: A. SUMMERSON
Hon. Secretary: J. Y. BALDWIN

W. W. BIRCH
C. BROMLEY
JACOB CONRAD
W. CUNNINGHAM
S. A. H. CULPEPER
J. WOOD DAVIS
G. H. RICHTER
HON. W. H. SHERLOCK
JAS. STUART
E. T. WHITE

and the Exchange Room Directors.

Committee of Correspondence:

Chairman: GEO. H. HAWTAYNE, C.M.G., F.R.G.S.
Vice-Chairman: REV. W. B. RITCHIE, M.A.
Hon. Secretary: J. J. QUELCH, B.Sc.
Treasurer: F. A. CONYERS.

S. M. BELLAIRS
VERY REVD. DEAN CASWELL
H. H. CUNNINGHAM
THOMAS DALY
DR. H. B. FORD
P. P. FAIRBAIRN
G. F. FRANKS, M.A., F.G.S.
T. S. HARGREAVES, F.R.G.S., F.G.S.
PROF. J. B. HARRISON, M.A., F.I.C., F.G.S.
L. M. HILL, C.E., A.M.I.C.E.
HON. B. H. JONES
H. KIRKE, M.A., B.C.L.
ÆNEAS D. MACKAY
REV. D. J. REYNOLDS
HIS HONOUR W.A.M. SHERIFF
SAMUEL VYLE

J. B. WOOLFORD