

wherever green flowers possess any perianth, or the relic or rudiment of any perianth, or are genetically connected with perianth-bearing allies, they have once possessed coloured insect-attracting corollas. In short, green flowers seem always (except in gymnosperms) to be the degenerate descendants of blue, yellow, white, or red ones.

GRANT ALLEN

THE INSTITUTION OF MECHANICAL ENGINEERS

THE town of Leeds is this year the place of the summer meeting of the above institution. This meeting, which commenced last Tuesday, has brought together a large number of engineers from all parts, who received a cordial welcome from the Mayor and a local committee, and have already gone through the greater portion of a very interesting programme. The president's address, as well as the papers read in the mornings, not less than the varied nature of the works thrown open in the afternoons, show the increasing connection of the engineer with the progress of civilisation and the comforts of daily life. Perhaps no better example of this could be found than in the town of Leeds. It is not necessary, and certainly it would not be very easy, to detail all the varied productions of Leeds, in which the engineer now plays an indispensable part. One or two interesting instances may, however, be cited from one of two papers read, to show to what extent manual labour is being replaced by the application of machinery.

As late as 1857 nearly all the clothing in Leeds was hand-made. At the present time a machine like a band-saw, but with a knife-edge, is employed to cut out the clothes. Some twenty-five pieces of double-cloth laid on each other are thus cut out at once. The parts are then sewn at the rate of from 700 to 2000 stitches a minute, and finally are ironed by a machine. Indeed, the several processes of cutting out, sewing together, binding, braiding, putting in sleeves, sewing on buttons, making button-holes, and ironing, are all done by machinery. The result is that between three and four million garments are annually made in Leeds alone. In the hat and cap industry, machinery is very largely used, the production being as much as 70,000 dozen per week. The manufacture of boots and shoes is carried on almost entirely by machinery, and though each boot passes through the hands of from six to twelve persons, such an article can be completely made in half an hour, from one to two million pairs of boots are being thus annually produced. The saving of manual labour, as seen by the above facts, presents a striking contrast to its waste as shown in the gigantic structures of the East; but, as the President in his address remarked, there is a reverse to the medal. The smoke nuisance yet overshadows much good work (in few places more than in Leeds), when it is admitted that it is altogether inexcusable, and cannot be too severely dealt with. Science and art have practically overcome it; and experience enables many to assert that money can be profitably laid out and yield good interest in the abatement of this unpardonable nuisance. It is to be hoped that one result of these meetings will be to do all that is possible that posterity may not "assuredly lay its finger upon the great blot of waste, and stigmatise our age as the Black Age, which has spoilt by careless, unnecessary, and selfish emissions of smoke and noxious gases, many a noble town and many a lovely spot on earth."

H. S. H. S.

PROFESSOR HAECKEL IN CEYLON¹

AFTER a fortnight devoted to the enjoyment of all that was new and strange in life in Ceylon, a fortnight fruitful in result to so shrewd and ardent an observer of nature and mankind, Professor Haeckel betook

¹ Continued from page 275.

himself in earnest to the real object of his journey and looked about for the most favourable spot at which to conduct his zoological investigations. These were to be confined to that class of animal life which has been the object of Professor Haeckel's special study, namely, the Radiata, including star-fish, jelly-fish, etc., as well as corals, madrepores and other polypi. He hoped to make acquaintance with many new forms developed under the varying conditions of climate and coast formation and his letter in the August number of the *Rundschau* opens with a brief and succinct account of what these conditions are: "The conditions under which marine animals arrive at their fullest development are numerous and peculiar and it is by no means a matter of indifference what portion of the sea-coast we select for our investigations. The various qualities of sea water, its saltness, purity, temperature, rate of current and depth, must all be taken into account; and no less important, in fact often more so, is the nature of the neighbouring shore; whether it is rocky or sandy, barren or fertile and what is its geological formation. Then again, the amount of fresh-water drainage at any particular point, and the greater or less force of the waves have an important influence on the development of the marine fauna. For the classes in which I am more particularly interested: the Radiolites, Medusæ, Siphonophoræ, etc. the most favourable conditions are a deep, land-locked bay of clear still water, undisturbed by the influx of any great volume of fresh water and having strong currents setting towards the shore. Such a combination of favouring circumstances exists, for instance, in the Bay of Messina, the Gulf of Naples and other parts of the Mediterranean shore, long the chosen resort of zoologists. A glance at the map of India will show that such protected bays are of far rarer occurrence along its coast than on the many limbed and deeply indented shores of our glorious Mediterranean. The coast of Ceylon is provided with three only: the two beautiful harbours of Galle and Belligemma on the S. West coast and the magnificent isle-dotted Gulf of Trincomalee on the N. East. This last, Nelson declared to be one of the finest harbours in the world. The English government, quick to see the natural advantages of its dependencies and liberal in turning them to account, lost no time after the acquisition of Ceylon in forming Trincomalee into a fortified and well appointed harbour, by strengthening the forts already erected by the Dutch and by promoting in other ways the prosperity of the town. Much still remains to be done to make Trincomalee worthy of its position as the strongest harbour of refuge along the whole Indian coast. In the struggle in which England is sure sooner or later to be engaged for the possession of her Indian empire, this place will have an important part to play."

To so favourable a spot for the prosecution of his researches, the Professor naturally turned with a longing eye, but the difficulties of the long journey from Colombo to Trincomalee were insurmountable. There is no railway beyond Kandy, and from thence the journey must be made in bullock carts over bad roads and through thick forests. The season too was unfavourable; the heavy rains of the south-west monsoons having swelled the streams and carried away some of the bridges. The carts containing the sixteen chests of instruments, etc., necessary to the Professor's existence, would most assuredly have either stuck fast altogether or only arrived after much delay and with damaged contents. Nor were there any better prospects of a passage by sea. The little steamer usually forming the most direct means of communication for all places on the coast was laid up at Bombay for repairs, and the risk and uncertainty of sailing boats could not be thought of. With much regret, therefore, Professor Haeckel abandoned the idea of Trincomalee, and there only remained for him to decide between Galle and Belligemma. It is a proof at once of his ardour and

sincerity as a man of science that his choice finally fell on the latter. In leaving Galle he turned his back upon civilisation, upon intercourse with fellow-zoologists and upon all the aid which would have been afforded to him by the works of those who had preceded him in similar studies there. But the charm of exploring hitherto untrodden fields of discovery, of pursuing his studies in undisturbed solitude, and, we suspect, of dispensing with the dress-coat, which appears to have been a weight on his mind in all his intercourse with Anglo-Indian society, turned the scale in favour of Belligemma, a little fishing village, inhabited by 4000 Singhalese, without a solitary European among them. Nor had he reason to regret his choice. "The six weeks," he says, "which I spent in Belligemma were overflowing in impressions of beauty which I shall never lose, and are among the most delightful of my Indian memories. I might have found Galle a better and more convenient place for my special zoological purposes, but it could not have been nearly so rich in materials for enriching my views of nature and mankind in general."

Many preparations were necessary for a lengthened stay in so solitary and primitive a place as Belligemma. In the first place, permission had to be obtained from the Governor, Sir James Longden, for the Professor's residence in the Rest-House, since a stay of a few days is all that is usually allowed in these official substitutes for hotels.

The permission was of course, readily granted, and the Professor digresses to give a few words of strong commendation to the order and regularity which everywhere follows British rule, and to the practical good sense with which the Home government varies its mode of dealing with its colonies according to their requirements and idiosyncracies. Ceylon, for instance, is independent of the Indian government, and immediately under the control of the Colonial Minister in London; the Governor is virtually supreme, and seldom has recourse to the decisions of his purely deliberative parliament. It is customary to ascribe to this despotism, so averse to the English nature in general, most of the grievances which affect the prosperity of the island; but better reflection seems to show that a colony containing two and a half million inhabitants, among whom not more than 3,000 are Europeans, requires the concentration of power in a single hand, and that a truer ground for complaint is the Governor's short tenure of office, four years barely sufficing to make him acquainted with the needs of the island and its inhabitants.

Prof. Haeckel's next care was to provide himself with letters of introduction for his stay in Galle, *en route* for Belligemma, and having made all necessary purchases, to see his sixteen chests securely packed on a great two-wheeled bullock cart which was to occupy a week on the road between Colombo and Galle. Bullock carts form the only means of transit for heavy goods in those parts of Ceylon which are provided with roads. The large ones carry as much as forty hundredweight, and are drawn by four humped oxen or zebus. The waggon is a barbarous two-wheeled contrivance, with a covering of plaited cocoa-nut leaves, and the weight has to be carefully disposed so as to throw the centre of gravity exactly over the axis of the wheels. Hundreds of such carts, some with two, others with four oxen are thus employed along the roads connecting the towns of Ceylon.

On December 9th, Prof. Haeckel left the hospitable Whist Bungalow, accompanied by the hearty good wishes and judicious counsels of his host and other friends. His description of the journey from Colombo to Galle is graphic and interesting; we must confine ourselves, however, to one or two points, which seem most likely to interest English readers, who may perhaps be already familiar with the main points of a journey so often described. A railway now takes the place of the old carriage road for about one third of the whole distance.

The line keeps close to the coast, traversing the palm woods in a direction almost due south and ending at Caltura. The continuation of the line from Caltura to Galle, which would be of the greatest advantage to the latter place, has not been sanctioned by the government from the apprehension that Galle would thereby be enabled to compete with Colombo as the chief town of the island. The intercourse between the two towns is very lively and constantly increasing, so that of the commercial success of the railway no doubt could be entertained. Unhappily, the persistent desire to elevate Colombo to the prejudice of Galle has influenced the Government to refuse a concession to the company that was able and willing to find the capital for the undertaking.

"This action and its motive is the subject of much and very general complaint. Travellers have no resource but either to hire a very expensive private carriage, or to trust themselves to the 'Royal Mail Coach' which makes the journey daily between Caltura and Galle; but this is also very dear and far from comfortable. . . . The most trying part of this coach journey and of all similar journeys in Ceylon is the cruel torture to which the unhappy horses are subjected. The Singhalese appear to have no idea that driving is an art which does not come by nature; nor that any process of education or 'adaptation' is necessary to prepare horses for going in harness. On the contrary, they appear to think that the whole affair is one of intuition, and that the knowledge of how to pull is hereditary in horses. Without any previous training the unhappy animal is fastened to the carriage by a very clumsy and imperfect harness, and then tortured with every variety of ingenious device, until, in sheer desperation, he sets off at a gallop.

. . . The Holy Inquisition itself was not more fertile in resources for bringing heretics to repentance; and as I sat on the box-seat for a quarter of an hour or longer at a time, I often wondered for what sins these unhappy animals could thus, with any justice, be punished. It is possible that similar conjectures arose in the minds of the black coachman and conductor, who no doubt professed Siva worship, and believed in the transmigration of souls. Perhaps they thought that by inflicting these tortures they were avenging themselves on those cruel princes and warriors who once oppressed their people. Either some such idea as this, or their total want of sympathy with the sufferings of animals (perhaps, too, that curious belief existing in some parts of Europe that animals have no feeling), must account for the fact that the Singhalese regard the torturing of horses and oxen as a kind of amusing pastime. The arrival of the mail coach, and the changing of the horses is the great event of the day at every village, and all the inhabitants turn out to watch the proceeding with eager curiosity, to inspect and criticise the passengers, and to take an active part in the torturing of the freshly harnessed horses. When despair at last induces the animals to take flight, they rush in headlong gallop, followed by the yells of the assembled crowd, until their breath fails and they fall into a slower pace for about half an hour, when, covered with sweat, with foaming mouths and trembling limbs, they halt at the next station, and are released for a time from their sufferings. It need hardly be said that this mode of travelling is neither pleasant nor devoid of risk to the traveller who trusts himself to the mercies of the Mail Coach driver. The coach itself is often upset and broken to pieces; the terrified horses spring suddenly to one side, or push the coach backwards into a banana bush or a ditch. I was always careful to be ready for a spring from my perch on the box seat. It is scarcely credible that the English government, usually so solicitous for order and discipline should have allowed this cruel treatment of horses to continue so long, and not have taken steps for its repression, at all events as

far as concerned the horses of their own 'Royal Mail Coach.'

"The general character of the landscape varies very little during the whole long stretch of seventy miles between Colombo and Galle, but for all that the eye never tires. The constant charm of the cocoa woods, and the endless variety of the groups of palms prevent any sense of monotony. The glow of the tropical sun is tempered by a cool sea breeze, and by the shade of the palms. It is true, that their feathery foliage does not afford so thick and refreshing a shade as that of our northern forest trees; but very often the slender stems of the palms are covered with a lovely tangle of climbing pepper-wort, and other creepers, which hang in graceful festoons of thick foliage from crown to crown, many of them with blossoms of brilliant hue, such as the flaming *gloriosa superba*, the rose-red Bougainvillea and gay-coloured papilionaceous plants of different kinds. Here and there among the palms stand other trees, such as the noble mango, and the bread-fruit tree, with its thick dark green crown of leaves. The pillar-like stem of the graceful papaya tree (*Carica papaya*), is beautifully inlaid and adorned with a regular diadem of broad, hand-shaped leaves. Different kinds of jasmine, of orange and lemon trees are thickly covered with fragrant white blossoms. And nestling among the trees are the neat white or brown huts with their picturesque surroundings; one would seem to be driving through one long continuous village of palm gardens if one did not occasionally come upon a denser region of forest or upon a real village with its closer row of houses and country bazaar or market place. The road turns frequently towards the sea, and sometimes actually skirts the rocky coast. Here tracts of soft level sand alternate with rocky hillocks picturesquely clothed with the curious pandanus or screw pine. The cylindrical stem of this tree, seldom more than from twenty to forty feet in height, is bent and twisted, and its branches are forked or extended at right angles like a chandelier. Every branch bears at its extremity a thick bunch of large sword-shaped leaves (like the *Daacaenæ* and the *Yucca*). Some of the leaves are sea-green, others of a darker shade, all gracefully curved and with a spiral twist at their base, which gives the branch very much the appearance of a screw. At the base of the whole bunch of leaves hang white clusters of blossom with a marvellous perfume, or large red fruit very like the Anana. But the tree is chiefly remarkable for its numerous delicate air-roots, which are given off from the stem and ramify downwards in many directions; when they reach the ground they take root and serve to support the weak stem. It looks as if the tree were walking on stilts, as it rises above the lower brushwood, pushing its way between the cleft rocks of the shore, or creeping along the ground at their base. The white sand composing the level tracts of the shore is diversified with dark, rocky headlands and animated by brisk little sand crabs so nimble in flight as to have earned the classic name of *Ocypode*. Numerous hermit crabs too, (*Pagurus*) wander with a more leisurely pace among their swift-footed cousins, and bear with much dignity the snail shells which protect their soft and sensitive hind-quarters. Here and there sand-pipers, herons, plovers, and other shore birds, are busily employed in catching fish, in formidable competition with the Singhalese fishermen. The latter pursue their calling, some singly, others in companies, in which case they go out in several canoes with enormous nets which they all draw to shore together. (The members of the fisher caste are all Christians, having renounced their Buddhist faith in order to be able to take the life of the fish without deadly sin.) The single fishermen catch their prey by preference in the foaming surf. It is amusing to see the naked brown figures, with only a broad-brimmed straw hat to protect them from sunstroke, spring boldly into the waves and catch the fish in a little hand net. They appear as much

in their element in the cool sea water, as do their little children who sport in troops along the shore and swim to perfection at six or eight years old." Among the beauties of this most beautiful journey, Prof. Haeckel further enumerates the river Deltas, of which there are many on this part of the coast, their dark forest of mangrove trees giving the landscape a deeper tone; and also the extensive lagoons which (especially between Colombo and Caltura) connect the rivers of the coast with each other. The Dutch took so much delight in these watery roads as reminiscences of their fatherland, that they formed them into a regular canal system to the neglect of the land roads. Numerous little trading boats sailed along the lagoons from place to place and formed their principal means of communication. But since the English have constructed their present excellent roads, the water traffic has almost ceased.

"The lagoons, with the thick bamboo and palm woods of their shores, with the lovely little islands, and rocky groups mirrored in their bosom, afford to the traveller a succession of enchanting pictures, especially where groups of slender cocoa palms tower over the dark green woodland masses, forming as Humboldt says: 'a forest above the forest.' The long range of hills in the blue distance forms a suitable background, higher mountain summits beyond rising here and there, and the stately dome of Adam's Peak towering over all."

NOTES

JUST three weeks after the sad death of Prof. Balfour, science has sustained another great loss in the death of Mr. W. Stanley Jevons. He was drowned in the sea between St. Leonard's and Bexhill, on Sunday morning, while bathing. He and his wife and family had been staying at Cliff-house, Galley-hill, for the last five weeks. Mr. Jevons was only in his forty-seventh year. Further details we must reserve for next week.

THE death is announced of Prof. Leith Adams, M.A., of the Queen's College, Cork. Entering the Army in 1848 as assistant surgeon, he became Surgeon-Major in 1861. His report on the Maltese cholera epidemic of 1865, and his devotion to the sick, received warm praise. He ultimately retired from the army in 1873 with the rank of Deputy Surgeon-General, and was appointed Professor of Zoology in the College of Science in Dublin, holding the chair till 1878, when he became Professor of Natural History in the Queen's College Cork. He was made a Fellow of the Geological Society in 1870, of the Royal in 1872, an LL.D. of Aberdeen in 1881, and a D.C.S. of the Queen's University a few weeks before his death. His chief works are the "Wanderings of a Naturalist in India," the "Western Himalayas and Cashmere" (1867), "Notes of a Naturalist in the Nile Valley and Malta" (1870), "Field and Forest Rambles, with Notes and Observations on the Natural History of Eastern Canada" (1873), and his "Monograph on the British Fossil Elephants" (1877).

A SCHEME for obtaining in a more effectual manner than hitherto a complete Annual Record of published scientific work is to be brought before the British Association this year by Prof. Sollas, of University College, Bristol. It requires (1) that each nation furnish a record of its own work, and of that only; (2) that each nation receive the records of every other nation in exchange for its own. Each nation would then merely have to classify and translate the records. For the working out of the scheme (a) National Committees, and (b) an International Congress would be required. The Committees, each consisting of a number of sections, would have, as functions, to produce the national records, to receive and transmit exchanges, to arrange for translations, and to superintend the combination of the sepa-