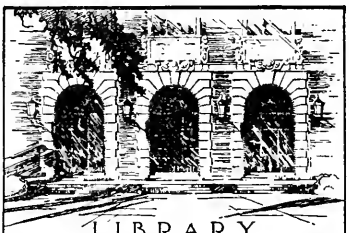

MAY 1895.] [Price 3s.

PROCEEDINGS

OF THE

LINNEAN SOCIETY OF LONDON.

FROM NOVEMBER 1893 TO JUNE 1894.

LONDON:
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PROCEEDINGS

OF THE

LINNEAN SOCIETY OF LONDON.

(SESSION 1893-94.)

November 2nd, 1893.

Prof. CHARLES STEWART, President, in the Chair.

The Minutes of the last Meeting were read and confirmed.

Mr. Henry Meyners Bernard was elected a Fellow.

The Meeting having been declared special for the election of a Councillor in the place of Mr. George Brook, deceased, the President announced that the ballot would be taken to fill the vacancy thus caused, and would remain open till 9 o'clock.

The President then moved that the thanks of the Society be given to Lady Arthur Russell for the valuable collection of engraved portraits of naturalists which she had been so good as to present to the Society in the name of her husband, the late Lord Arthur Russell, and the resolution having been put to the Meeting was carried unanimously.

The President called the attention of the Fellows to the improvement which had been carried out in the Society's apartments by the introduction of the electric light, for which they were indebted to the liberality of their Treasurer, Mr. Crisp, who on former occasions had shown himself so marked a benefactor to the Society, and moved that the hearty thanks of the Meeting be given to Mr. Crisp for his munificent present. The resolution was carried unanimously.

The President then referred in suitable terms of regret to the removals by death from the Society's roll which had occurred during the interval, among which special mention was made of

the death of the Rev. Leonard Blomefield, whose connexion with the Society lasting for 70 years had been recently made the subject of a congratulatory address (Proc., Nov. 17, 1892); of Mr. George Brook, whose removal from their Council had caused the vacancy they were this evening called upon to fill; and of the distinguished Entomologist, Mr. Francis P. Pascoe.

The Ballot for a member of the Council having been closed, the President appointed Mr. Albert D. Michael, Mr. Edmund G. Baker, and Mr. Antony Gepp, Scrutineers, and the votes having been counted and reported to the President he declared Mr. Henry Seebohm to be unanimously elected.

Mr. George Murray exhibited and made remarks upon a series of seaweeds mounted as lantern slides, some of which were new to Great Britain. He also showed some specially prepared tins which were recommended for collecting purposes, but which in the opinion of some present would be likely to become speedily useless from oxidation.

Mr. E. M. Holmes showed some new British Marine Algæ, and made remarks on their affinities.

Dr. Prior exhibited the fully developed fruit of *Pyrus japonica* from Rogate, Sussex, which is seldom seen although the plant is common in cultivation, and alluded to its use as a conserve if it could be obtained in sufficient quantity.

The following papers were read:—

1. "A Contribution to the Phanerogamic Flora of Matto Grosso and the Northern Chaco." By Spencer Le M. Moore, F.L.S.

2. "On a new Freshwater Schizopod from Tasmania." By George Malcolm Thomson, F.L.S.

November 16th, 1893.

Prof. Charles Stewart, President, in the Chair.

The Minutes of the last Meeting were read and confirmed.

Mr. J. H. Veitch exhibited a large and interesting collection of economic and other vegetable products of Japan recently brought by him from that country, and described the various uses to which different kinds of wood, fibre, grass, &c. were applied for domestic purposes; as also the way in which various seaweeds were collected and prepared for food.

Mr. A. G. Renshaw exhibited a remarkably large specimen of the Giant Puffball, *Lycoperdon giganteum*, which he had gathered at Catford Bridge, considered to be above the average dimensions.

On behalf of the Rev. Prebendary Gordon, M.A., the Secretary exhibited a specimen of *Veronica salicifolia* of New Zealand, found growing in Langlands Bay, Mumbles, Swansea.

The following paper was read:—

"On the Origin of Plant-structure through Self-adaptation to the Environment, exemplified by Desert and Xerophilous Plants." By the Rev. George Henslow, M.A., F.L.S.

December 7th, 1893.

Prof. Charles Stewart, President, in the Chair.

The Minutes of the last Meeting were read and confirmed.

Mr. John Henry Cooke, Surgeon Captain Henry Cummins, and Messrs. Richard Ernest Leach, Charles Sharp, Albert Smith, Frederick Charles Smith, Alexander Henwood Teague, and Henry Lambert Thompson were elected Fellows

Mr. C. T. Druery exhibited and made remarks upon a new example of apospory in *Scolopendrium vulgare*, and Prof. Bower brought forward a similar case in *Trichomanes Kaulfussii*.

Mr. George Brebner exhibited some new and rare British Algæ, including *Haplospora globosa*, *Tilopteris Mertensii*, *Ectocarpus tomentosoides*, and *Polysiphonia spinulosa*, var. *major*.

Mr. F. Enock, with the aid of the oxyhydrogen lantern, exhibited the various stages of development of the Black-Currant Mite, *Phytopus Ribis*, and gave an account of its life-history.

Mr. Thomas Christy exhibited a gigantic reed-like stem from the Zambesi, with drawings of sections. It appeared to be allied to *Sanseviera cylindrica*, but differed conspicuously in the greater size of the leaves, which measured about 9 feet in length instead of from 18 inches to 3 feet. The remarkably tough and strong fibre which it produced is considered to be of great commercial value, being equal to the best Sanseviera hemp.

The following papers were read:—

1. "Catalogue of the described Neuroptera Odonata (Dragonflies) of Ceylon, with description of new species." By W. F. Kirby, F.L.S.

2. "On the Cause of the Fall of the Corolla in *Verbascum*." By Signor U. Martelli. (Communicated by the President.)

December 21st, 1893.

Prof. Charles Stewart, President, in the Chair.

The Minutes of the last Meeting were read and confirmed.

Messrs. George Edward Joseph Greene and Arthur G. Tansley were elected Fellows.

Mr. P. L. Simmonds exhibited a collection of New Zealand Mosses formed by Mr. G. W. Simmonds while surveying in H.M.S. 'Pandora.'

The President exhibited and described two curious examples of associated Ants and Plants, viz.: *Iridomyrmex caudatus* with *Myrmecodia Beccari*, and *Camponotus planatus* with *Pseudomyrma Belti*, the plant being *Acacia Hindsii*.

Mr. J. E. Harting exhibited some shells of *Planorbis corneus* which had been found by the riverside at Weybridge, and from some unexplained cause were curiously bisected.

Referring to a MS. letter of Dr. Stephen Hales (the author of a work on "Vegetable Staticks," and a friend and neighbour of Gilbert White) which was found amongst the papers of the late Sir Richard Owen, and shown to the Meeting by Mr. George Murray, an excellent engraved portrait of the writer was exhibited by Mr. Harting and presented to the Society.

The following papers were read:—

1. "An Enumeration of all Orchideæ hitherto recorded from Borneo." By H. N. Ridley, F.L.S.

2. "Hepaticæ collected by W. R. Elliott in the islands of St. Vincent and Dominica." By R. Spruce, A.L.S.

January 18th, 1894.

Mr. William Carruthers, Vice-President, in the Chair.

The Minutes of the last Meeting were read and confirmed.

Sir Hugh Low and Messrs. George Bell Rothera and Thomas Sim were elected Fellows.

The Chairman, before proceeding to the business of the evening, referred to the loss which the Society had sustained by the recent death of Mr. Richard Spruce, who had travelled and collected much in South America, and was a recognized authority on Hepaticæ. He also feelingly alluded to the death of Mr. Algernon Peckover, who had been a Fellow of the Society since the year 1827, and had bequeathed to it a legacy of £100.

Mr. E. M. Holmes exhibited a flowering specimen of a new species of *Cascarilla* (*C. Thomsoni*), and the bark of the tree from New Grenada; also two new foreign seaweeds, *Gelichium Beckeri* from South Africa, and *Leptocladia Binghamia* from California, and three new British Marine Algæ, viz. *Entophysalis granulosa* and *Symploca atlantica* from Swanage, collected by himself, and *Vaucheria coronata* from Arbroath, collected by Mr. J. Jack.

Mr. Thomas Christy exhibited and made observations on some remarkably long tendrils of *Landolphia Kirkii*, which served as an illustration to a paper subsequently read by Mr. Henslow.

Mr. J. E. Harting exhibited and made some remarks upon the plant débris ejected in the form of 'pellets' or 'castings' by Rooks, and stated that a number of these pellets which had been examined were composed of the cuticles of the succulent roots of the Couch grass (*Triticum repens*), commonly called 'scutch,' 'squitch,' and 'twitch' grass, a most troublesome weed to the farmer. He also exhibited a rare Australian Duck, *Stictonetta nævosa*, Gould, which had been obtained at Gippsland Lakes, Victoria, and of which very few examples were to be found in collections. It was to be presented to the British Museum.

The following paper was read:—

"On the Origin of the Structural Peculiarities of Climbing Stems by Self-adaptation in response to External Mechanical Forces." By the Rev. G. Henslow, F.L.S.

February 1st, 1894.

Prof. Charles Stewart, President, in the Chair.

The Minutes of the last Meeting were read and confirmed.

The President exhibited a remarkable specimen of a South-African Butterfly, *Teracolus halyattes*, from Natal, in which the wings on one side were those of a male, and on the other those of a female, and made some remarks upon hermaphrodites in the Lepidoptera.

On behalf of Mr. William Borrer, of Cowfold, Sussex, there was exhibited a skull of the Pine Marten, *Martes sylvestris*, Nilsson, from a specimen killed near Crawley (Zool. 1891, p. 458), an examination of which confirmed the view of the late E. R. Alston (Proc. Zool. Soc. 1879, p. 469), that, so far as could be ascertained, this is the only species of Marten found in the British Islands.

On behalf of Mr. W. B. Tegetmeier there was exhibited a drawing of a Snow-Leopard, taken for the first time from life, viz., from the animal now living in the Zoological Society's Gardens, Regent's Park.

The following papers were read:—

1. "On the Morphology of the Pedipalpi." By Malcolm Laurie, F.L.S.

2. "On the Freshwater Algæ of the West Indies." By William West, F.L.S.

February 15th, 1894.

Prof. Charles Stewart, President, in the Chair.

The Minutes of the last Meeting were read and confirmed.

Mr. Linnæus Greening was elected a Fellow.

Mr. W. B. Hemsley exhibited some germinating seeds of *Lemna* and some flowering plants of *Lemna gibba*, upon which in his absence some remarks were made by Mr. C. H. Wright. From the observations made it was suggested that *Lemna gibba* is a dimorphic species, the male plants bearing a close resemblance to *Lemna minor*.

On behalf of the Director of the Royal Gardens, Kew, Mr. C. H. Wright exhibited and made some remarks upon a collection of native plants from the neighbourhood of Cape Town, which had been presented to the Herbarium by Miss Yorke, and were remarkable for the skilful way in which the natural colours of the flowers had been preserved.

On behalf of the Rev. J. G. Tuck of Tostock Rectory, Bury St. Edmunds, there was exhibited a hybrid between the common House Sparrow and the Tree Sparrow (*Passer montanus*), which had been taken near Bury on the 13th January last. Only one instance of a similar wild hybrid was known to have been previously captured, although two or three instances were on record of the two species interbreeding in aviaries.

The following papers were read:—

1. "On the Natural History of the Flower.—Part II." By J. C. Willis, M.A. (Communicated by Francis Darwin, F.L.S.)

2. "On Hygroscopic Movements connected with Seed Dispersal." By Miss Dorothea F. M. Pertz. (Communicated by Francis Darwin, F.L.S.)

March 1st, 1894.

Prof. Charles Stewart, President, in the Chair.

The Minutes of the last Meeting were read and confirmed.

Mr. Alexander Whyte was elected a Fellow.

Dr. Maxwell T. Masters exhibited a remarkably fine specimen of *Peziza tuberosa* on a root of *Anemone*. It was only comparatively recently that the hard lumps (Sclerotia) in the soil of *Anemone* beds had been definitely associated with the fruit of this *Peziza*; at one time the Sclerotia were regarded as diseased masses of the root-stock.

Dr. Masters also exhibited some root-galls on Plum caused by *Cynips terminalis*. Mr. Cameron, in his 'Monograph of the *Cynipidæ*,' published by the Ray Society, had noticed galls formed by this insect on the Beech, Pine, and Vine, but not on the Plum.

Mr. Digby Nicholl exhibited a singular variety of the Partridge (*Perdix cinerea*) which had been shot by Mr. A. Waugh near Creswell, Northumberland, in September 1893. In colour it resembled the Red Grouse, having the breast and flanks suffused with large patches of dark reddish-brown, and the dorsal plumage very much darker than usual. Mr. Harting pointed out that this variety was described and figured by the late John Hancock in his 'Catalogue of the Birds of Northumberland,' where it had been met with more than 20 years ago, and in which county he himself had procured a specimen at Corbridge-on-Tyne, which was preserved in the collection of varieties formed by the late Mr. F. Bond.

Mr. Norman Douglas exhibited a black variety of the Water Vole (*Arvicola amphibius*), captured at Banchory, Kincardineshire, remarking that this variety, which was at one time considered to be restricted to Scotland, had been met with in several English counties (Zoologist, 1892, pp. 281–293), and was well established in the fen country of Norfolk and Cambridge.

The following papers were read:—

1. "Algological Notes from Cumbrae—On the Origin of the Filamentous Thallus of *Dumontia filiformis*." By George Brebner. (Communicated by George R. M. Murray, F.L.S.)
2. "Entomostraca and the Surface-film of Water." By D. J. Scourfield. (Communicated by Prof. L. C. Miall, F.L.S.)

March 15th, 1894.

Prof. Charles Stewart, President, in the Chair.

The Minutes of the last Meeting were read and confirmed.

Mr. Isaac H. Burkill and Dr. José Camillo Lisboa were elected Fellows, and Mr. Thomas Hick an Associate.

Mr. Clement Reid exhibited some cones of Scotch Fir, and also some carbonized pine-wood, from a peat moss at Parkstone, Dorset. He said the Pine had become extinct in the South of England after Neolithic times, and had been re-introduced only recently. Its extinction was commonly supposed to be due to forest fires. He found that every piece of pine-wood embedded in the peat moss was similarly charred, while portions embedded in sand were but little altered, and he suggested that the appearance of burning might possibly be due to the action of the growing peat, and have nothing to do with fire. A discussion followed, in which reasons were given for adhering to the older theory.

Mr. William Carruthers exhibited a diagrammatic table, showing an accurate counting of the annual rings of growth in three gigantic specimens of Wellingtonia (*Sequoia gigantea*), from which he calculated the age of the trees. A section of one in the Natural History Museum, 15 feet in diameter, which was a living tree when cut down, he estimated to be 1330 years old. As illustrative of the size to which these trees grow, he mentioned that he had measured two in America, one of which was 92 feet and the other 77 feet in circumference. A discussion followed, in which Mr. George Murray pointed out that a number of experiments had been made to test the rate of growth of various trees under different conditions of weather and temperature, but that the results varied to such an extent as to afford no basis for sound conclusions.

Mr. A. B. Rendle exhibited the fruit of *Melocanna bambusoides* from the Mauritius, where it had been introduced, and gave some account of its structure and mode of growth.

The following papers were read:—

1. "On certain Authentic *Cyperaceæ* of Linnæus." By Chas. Baron Clarke, F.L.S.

2. "On the Development of the Mucilage Canals of the Marattiaceæ." By George Brebner. (Communicated by Dukinfield H. Scott, F.L.S.)

April 5th, 1894.

Prof. Charles Stewart, President, in the Chair.

The Minutes of the last Meeting were read and confirmed.

Mr. William C. Grasby, Dr. George Darby Haviland, Mr. Joseph Smith, and the Rev. John Frome Wilkinson were elected Fellows.

On behalf of Sir Joseph Hooker there was exhibited a portrait in oils of Sir Samuel Bentham, Kt., a colonel in the service of the Empress of Russia, painted at St. Petersburg in 1784. He was the father of Mr. George Bentham the distinguished botanist, and President of this Society 1861–74.

Mr. Buxton Shillitoe exhibited some specimens of a Primrose having abnormal leaf-like bracts immediately below the calyx, found growing along with ordinary plants of the same species.

An exhibition of some Trap-door Spiders and nests by Mr. Frederick Enock was deferred to a subsequent Meeting.

The following papers were read:—

1. "On the Aortic-Arch System of *Saccobranchus*." By R. H. Burne, B.A. (Communicated by Prof. G. B. Howes, F.L.S.)
2. "On the *Orchideæ* and *Apostasiaceæ* of the Malay Peninsula." By Henry N. Ridley, F.L.S.

April 19th, 1894.

Prof. Charles Stewart, President, in the Chair.

The Minutes of the last Meeting were read and confirmed.

The President announced that the following Auditors to examine the Treasurer's Accounts had been nominated by the Council, and by show of hands these were unanimously elected:—

For the Council { Mr. E. A. L. Batters.
Prof. George Bond Howes.

For the Fellows { Mr. Albert D. Michael.
Mr. James Groves.

On behalf of Sir Joseph Hooker there was exhibited a portrait of Jeremiah Bentham, father of Jeremy and Sir Samuel Bentham, b. 1710, d. 1792.

Dr. Prior exhibited specimens of *Pinus Pinsapo* with undeveloped catkin-like berries, and other specimens of Conifers in flower, all of which were grown in Somersetshire.

Mr. J. R. Jackson exhibited an Afghan knife, the sheath of which was bound with bark of *Caragana decorticans*, selected on account of its bronze-like appearance, and gave some account of the various native uses to which this bark is put.

On behalf of Mr. George Mayor and Mr. F. R. Maw, some photographs of abnormally situated nests of the Robin were

exhibited, one of which had been built upon a book-shelf in one of the studies at Tunbridge School, and another in an old tin tea-pot, which had been flung aside as useless and had lodged in a poplar.

Mr. B. Shillitoe exhibited and made remarks upon a Hyacinth with abnormal bracts.

An account of British Trap-door Spiders was given by Mr. F. Enock; and by the aid of the oxy-hydrogen lantern and some excellent slides their appearance and mode of life were graphically delineated and described.

The following paper was read:—

"A Monograph of the *Acetabulariæ*." By Graf zu Solms-Laubach, F.M.L.S.

May 3rd, 1894.

Prof. Charles Stewart, President, in the Chair.

The Minutes of the last Meeting were read and confirmed.

Dr. Johann Mueller and Prof. Dr. Kakichi Mitsukuri were elected Foreign Members.

Prof. Poulton exhibited the larvæ of certain Lepidoptera to illustrate the results of experiments which he had made in regard to the influence of environment upon their colours. Variously coloured twigs and shoots, such as occur in nature, were shown to influence the appearance of many twig-like larvæ in such a manner as to favour their concealment.

Prof. George Bond Howes exhibited and made remarks upon the eggs and young of *Ceratodus Forsteri* received from Prof. Semon of Jena, who is engaged in working out the development of this fish. He also showed a specimen of *Lepidosiren paradoxa*, from the backwaters of the upper Paraguay river, an extremely rare fish in collections, and commented upon its anatomy.

Mr. James Saunders of Luton, with the aid of the oxy-hydrogen lantern, exhibited some drawings of the plasmodium of *Didymium squamulosum* in the act of forming sporangia. The specimens had been found upon birch.

The following papers were read:—

1. "Notes on the Habits of three Species of *Lemna*." By H. B. Guppy. (Communicated by W. Botting Hemsley, A.L.S.)

2. "On the Fertilization of certain Malayan Orchids." By H. N. Ridley, F.L.S.

May 24th, 1894.

Anniversary Meeting.

Prof. CHARLES STEWART, President, in the Chair.

The Minutes of the last Meeting were read and confirmed.

Mr. Albert D. Michael on behalf of the Auditors presented the Treasurer's Annual Statement of Accounts, duly audited, as shown on p. 12.

A vote of thanks to the Treasurer for his services was proposed by Mr. Thomas Christy, seconded by Mr. Charles James Breese, and carried unanimously.

The Secretary read his report of deaths, withdrawals, and elections, as follows :—

Since the last Anniversary Meeting 19 Fellows had died, or their deaths had been ascertained, viz. :—

Dr. George Bennett.
Prof. Robert Bentley.
Rev. L. Blomefield.
Mr. John Charles Bowring.
Mr. George Brook.
Rev. Charles Clarke.
Mr. Dickinson Webster Crompton.
Mr. James William Davis.
Dr. Carl F. Fischer.
Prof. J. B. Lillie Mackay.
Mr. George Manners.
Prof. A. Milnes Marshall.
Mr. Francis P. Pascoe.
Mr. Algernon Peckover.
Dr. G. J. Romanes.
Mr. J. T. Tristram-Valentine.
Dr. Edward Hart Vinen.
Mr. John Jenner Weir.
Mr. John Woodland.

ASSOCIATE.

Mr. Richard Spruce.

FOREIGN MEMBER.

Prof. Pierre J. van Beneden.

During the past official year 7 Fellows had withdrawn, viz. :—

Mr. Archibald Campbell.
Dr. John Colebrooke.
Rev. Hilderic Friend.
Mr. George Charles Haité.
Mr. Charles Du Bois Larbalestier.
Dr. José Camillo Lisboa (since re-elected).
Mr. Samuel Hickling Parkes.

And 17 Fellows, 2 Foreign Members, and 1 Associate have been elected.

Receipts and Payments of the Linnean Society, from May 1st, 1893, to April 30th, 1894.

Receipts.	£	s.	d.
Balance at Bankers' on 1st May, 1893	229	19	1
Interest on Investments	222	17	3
Admission Fees	180	0	0
Annual Contributions	1426	4	1
Compositions	135	0	0
Sales of Publications:—			
Transactions £124 16 9			
Journals 61 0 0			
Proceedings and Catalogues 1 2 3			
	186	19	0
Donations	407	9	7
	£2788	9	0

Payments.	£	s.	d.
Taxes and Insurance	9	15	0
Repairs and Furniture	93	3	7
Coals and Gas	57	16	6
Salaries	672	3	4
Library:—			
Books £230 17 9			
Binding 82 15 8			
	313	13	5
Expenses of Publications:—			
Printing £446 5 11			
Illustrations 489 9 5			
Distribution 20 8 10			
	956	4	2
Miscellaneous Printing and Stationery	33	5	11
Petty Expenses (including Tea and Postage)	84	5	4
Investments	350	0	0
Balance at Bankers' on 30th April, 1894	218	1	9
	£2788	9	0

Investments on the 30th April, 1894.

	£	s.	d.		£	s.	d.
Consols, 2¾ per cent.	5070	9	10	@ 100½ p. c.	5096	5	5
Metropolitan 3½ per cent. Stock	1079	11	3	@ 115 p. c.	1241	9	10
Great Indian Peninsula Railway 5 per cent. Guaranteed Stock	630	0	0	@ 160½ p. c.	1011	3	0
Forth Bridge Railway 4 per cent. Stock	450	0	0	@ 133 p. c.	598	10	0
Consols (Westwood Bequest) 2¾ per cent	249	3	8	@ 100½ p. c.	250	0	0
				FRANK CRISP, *Treasurer.*	£8197	8	3

Audited and found correct. 17th May, 1894.

{ ALBERT D. MICHAEL, EDWARD A. BATTERS, JAMES GROVES, G. B. HOWES, W. PERCY SLADEN. } *Auditors.*

The Report on the Library was read as follows:—

During the past year there had been received as Donations from private individuals to the Library 62 volumes and 115 pamphlets and separate impressions of memoirs.

From the various Universities, Academies, and Scientific Societies there had been received in exchange and otherwise 225 volumes and 105 detached parts, besides 51 volumes and 30 parts obtained by exchange and donation from the editors and proprietors of independent periodicals.

The Council, at the recommendation of the Library Committee, had sanctioned the purchase of 211 volumes and 176 parts of important works.

The total additions to the Library were therefore 549 volumes and 426 separate parts.

The following is the number of books bound during the year:—

In half-morocco 284 volumes, in half-calf 12 volumes, in full calf 3 volumes, in full cloth 107 volumes, in vellum 19 volumes, in buckram 7 volumes, in boards or half cloth 29 volumes, relabelled (half-morocco and cloth backs) 24 volumes. Total 485 volumes.

The Secretary having read the Bye-Laws governing the elections,

The President opened the business of the day, and the Fellows present proceeded to ballot for the Council and Officers.

The Ballot for the Council having been closed, the President appointed Mr. Charles Henry Gatty, Dr. Robert Braithwaite, and Mr. Vincent Ind Chamberlain, Scrutineers, and the votes having been counted and reported to the President, he declared the following Members to be removed from the Council, viz.:—Mr. Edward A. L. Batters, Prof. George Bond Howes, Dr. Richard C. A. Prior, Dr. Dukinfield H. Scott, and Mr. Henry Seebohm; and the following to be elected into the Council, viz.:—Dr. John Anderson, Mr. Charles Baron Clarke, Prof. J. Reynolds Green, Mr. Arthur Lister, and Mr. Albert D. Michael.

The Ballot for the Officers having been closed, the President nominated the same Scrutineers, and the votes having been counted and reported to the President, he declared the result as follows:—

President, Mr. Charles Baron Clarke.
Treasurer, Mr. Frank Crisp.
Secretaries { Mr. B. Daydon Jackson. / Mr. W. Percy Sladen.

The President then delivered his Address, as follows:—

Presidential Address.

In the Museum under my charge there is a small section which is devoted to the illustration of the various organs and structures which are concerned in locomotion. It has long been my desire to render this group more complete, and not to be satisfied with merely showing the organs by which this important function is accomplished, but to show also, so far as is possible, the precise way in which it is effected, making preparations which shall illustrate the various phases of locomotion, the movements of the limbs, and the carriage of the body in the act of locomotion. It is impossible, of course, to do that which would be the best of all, namely, to keep the animals alive in order to exhibit their paces; but the next best thing would be, in my opinion, to have them preserved in such positions as would show their various natural attitudes in these important acts of their lives; and to that end I recently paid a short visit to Plymouth, where I was able to watch the movements of sundry animals in the Station of the Marine Biological Association.

The remarks which I have now to offer are mainly the result of these observations, together with a few other collateral matters which are closely allied to them. I may state, however, at once that I do not pretend to much originality in these results. Much of what I noted has been most likely observed by others and described by them; but in a few cases at least I think there may be some degree of novelty.

In the first place, as regards the method which I adopted in making my investigations, a few words seem desirable, for many persons, probably, may have opportunities of extending these observations, and it is as well, perhaps, to proceed on lines which have been found to be more or less successful. To attempt to follow with one's eye the twinkling action of the feet (if I may so use the term)—the rapid movements of the limbs—is a baffling and difficult proceeding; but I found that by very carefully fixing the attention solely upon one pair of limbs at a time, it was possible, in the majority of cases, to see what the rhythm was: watching, for instance, in the first place, the first pair of limbs, and seeing whether those of the opposite side were in opposite phases of movement. That being determined, one could then carefully observe and compare the movements of contiguous limbs on the same side, looking only at two, and disregarding all the others. By carrying on this process, one could soon arrive at the actual rhythm of limb movement, and the position of various parts, in the majority of cases. Clearly, however, where the movement was still more rapid, the eye could not follow it, and then instantaneous or very rapid photography was needed. I found it necessary to use a shutter giving an exposure of the 150th of a second.

One of the first forms which engaged my attention, because one of the commonest on our coast, is a crab whose movement is

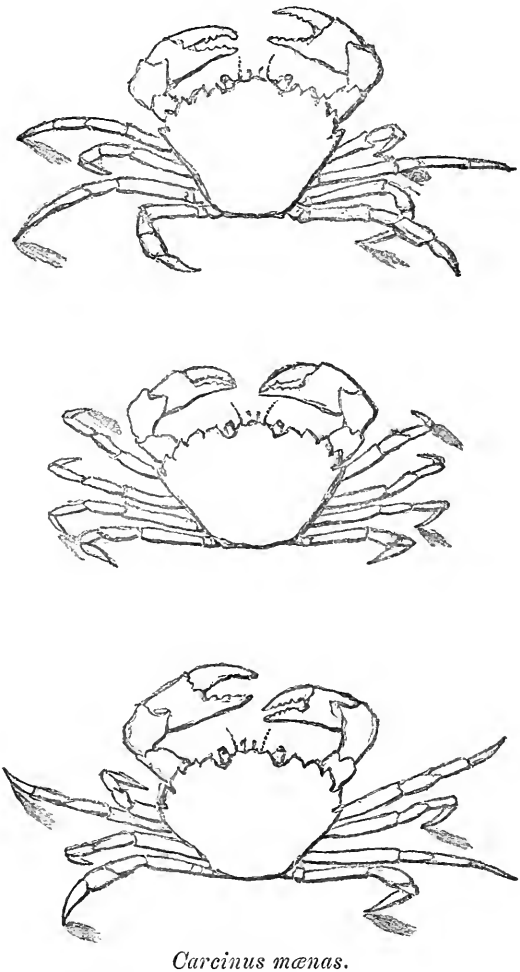
exceedingly simple; and consequently I thought it desirable to start with this. In *Carcinus mænas*, the common green Shore-Crab, I examined its movements as they would appear under water, the body being supported by the dense medium, in which, of course, it normally lives, and where its movements would be quite different, or comparatively different, from those which it would exhibit if walking upon dry sand. In this decapod—so called, not because it uses ten limbs for the purpose of walking, but because it has ten limbs borne upon the walking region—the anterior pair, the greater nippers or *chelæ*, in this, as in most decapods, are not used for purposes of locomotion but for offence and defence, and for holding and primarily tearing its prey. If the accompanying diagram (p. 16) be taken roughly to represent the outline of the carapace of this crab—the shield which protects its general body—it will be seen that the anterior portion is provided with a series of spines more or less defensive in their character, and in front is the excavation in which are lodged the stalked-eyes, and between them a little promontory. On each side a stalked-eye stands out, and between these are the short antennæ and the still shorter and more complicated antennules. On each side are the large chelæ.

Now for the actual limbs which are concerned in locomotion. There are four pairs, and, as in most of these crab forms, we find two pairs—that is, four limbs—constantly touching the ground, and two pairs, or four limbs, raised off the ground; those which are in action and upon the ground alternating with those which are out of action and off the ground. Now, supposing I represent this crab crawling towards the left (and, as a rule, they rather prefer crawling towards the left than in any other direction, though they can move in any): in this case the first and third pairs of limbs I may represent as having just been brought in contact with the ground, the left limbs being extended, the right flexed. By the flexion of the extended limbs and extension of the flexed, the crab will pull and push its body towards the left. The second and fourth pairs at the same time being raised off the ground will be passing into the position for action, so that when half a pace has been made all the limbs will be equally flexed. When the first and third pairs have completed their work they are raised, at the same time the second and fourth pairs are brought in contact with the ground. During locomotion under water the body of the crab is well raised off the ground and inclined upwards at an angle of about 45°, so that the sense-organs are brought into a favourable position for the better performance of their function.

Now there are two distinct advantages from this particular mechanism. We find, namely, that the crab always rests on the firmest possible basis—it rests upon four limbs. Again, whilst two are dragging, two on the opposite side (exactly corresponding) are pushing the body in the same direction, and the others are in exactly opposite phases. The result of this is that, if, for

any reason, the crab wants to change the direction of its motion —if, for example, it meets an enemy instead of a friend—it can at once, without the slightest pause, reverse its movement. If it wants suddenly to retreat, it has only to lower the two limbs which were previously off the ground, and to raise those which

Fig. 1.

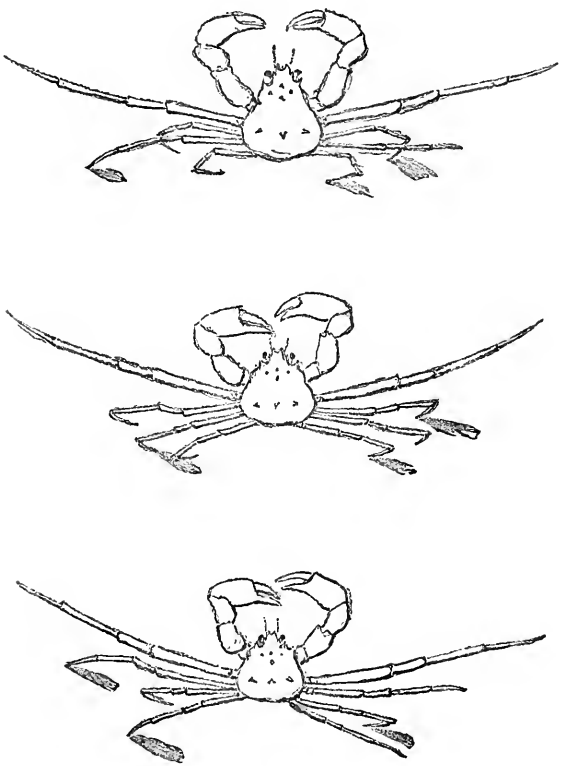


Carcinus mœnas.

are on the ground, when, by flexing the limbs on the right that are now in contact with the ground and extending those on the left, it can at once move in the opposite direction. Hence it follows that its course can be at once reversed, owing to the particular rhythm of limb-movement it possesss.

When the limbs are all equally bent, their position will not suggest running, although it will be a necessary phase in the running. Like certain movements of the horse, that very short period, that transient fraction of a second, which does not suggest running in the crab might be truthfully drawn by any artist, but it would not convey to us the idea of motion, any more than certain of the phases in the movement of a horse would suggest the galloping or the trotting of that animal, although they might

Fig. 2.



Inachus dorsettensis.

be perfectly true. This inelegant phase is apparently so transient that it escapes our observation, and should be omitted by the artist in pictorial representation. I think that the careful preservation of some of these forms (such as this particular shore-crab) in these, their true positions of locomotion, may not only be of biological interest as illustrating the mechanism of movement, but to a certain extent may be of use to the artist in enabling

him to realize at once the various phases of the movement, and thus to select from those phases that one which he may most require for pictorial representation.

The next form which I will speak about is one of these brachyurous Crustacea, in which the rhythm is extremely different for certain evident reasons. It is a crab whose carapace is very much smaller than the one just described, and is more or less heart-shaped. It is the crab known as *Inachus*.

This crab, unlike most others, never uses the first pair of limbs for the purpose of walking. These are much larger than the others, but in locomotion they are extended off the ground, almost horizontally, outward. There is the usual number of six joints—the common number possessed by crabs. These limbs, which are not used for locomotion, are more abundantly covered with the little hooked hairs which the external surface of this crab naturally bears, and to these hooked hairs the crab fixes (as all crabs do when they have these hairs) little pieces of foreign bodies, which it attaches for the purpose of concealment. This particular species commonly selects little pieces of sponge, which it fastens upon its large limbs, and these subsequently grow and encase the limb, so that it becomes a warty or gouty-looking limb, covered with pieces of sponge intentionally affixed by the crab, and afterwards, as it were, taking root and growing there. Now for the remaining three pairs. They, of course, have to move in a perfectly different rhythm from what would be the case if the crab had four pairs of effective limbs. Supposing the second of these on the left-hand side to have just come into action, we should have it extended, in contact with the ground, and pulling. Instead of, as in the case of *Carcinus mænas*, the corresponding limbs on the opposite side pushing—it is not so, it could not be, because there would be no true continuous movement if that were the case,—the limb or limbs in action on the right side are not the corresponding limbs to those in action on the left, but the alternate ones. The creature, therefore, is always resting on a tripod instead of on four limbs, with one limb on one side pulling and two on the opposite side pushing.

There is another form of some interest. It is the common Stone Crab (*Lithodes*) of the northern coast. Instead of being reduced to a hexapod, as in *Inachus*, by the non-use of the *anterior* pair of limbs for purposes of locomotion (they being simply raised off the ground as a sort of balancing pole), the *hind* pair of limbs, greatly reduced in size in *Lithodes*, are used to clean out the branchial chamber and adjacent parts, and thus, by suppression for locomotive purposes of the *hind* pair of limbs, the form is reduced to a hexapod, and so has precisely the same hexapod character of movement as is observable in *Inachus*.

We may now consider those cases in which the locomotive limbs are reduced to four. This reduction, one would naturally think, would lead to considerable complication, on the supposition that if more than one limb were raised at a time

there would be a great chance of the animal falling to one side, that is, it would have difficulty in keeping its balance. But the difficulty is got over in a very simple manner in this particular creature by the use of the chelæ as a supplementary means of locomotion. The form (*Eupagurus*) is one of which the commonest example, the Hermit Crab (*E. bernhardus*), is to be met with all round our coasts, and it is generally found sheltering its soft body in a dead whelk-shell. In the case of this crustacean we have a creature which, so far as I have seen, always crawls in such a fashion that the mouth of the shell which it inhabits faces directly forwards, the lip of the shell immediately overhanging and entirely concealing the carapace, only the sense-organs being allowed to protrude just beyond the margin of the lip together with the chelæ and two succeeding pairs of limbs. The third and fourth pairs are here greatly reduced in size, and are always kept within the whelk-shell, whose inner surface they are pressed against, serving to assist the abdomen of the Hermit Crab in maintaining its position in the shell. The antennæ are usually carried, one pointing in the direction of motion, and the other away from it. When in motion, the chelæ supplement the four other walking-legs, so that the locomotion is of the lateral hexapod type, differing from *Inachus* only by the chelæ taking the place of one of the pairs of limbs no longer used for progression.

If this Hermit Crab be moving in the direction from right to left, we may find the following state of affairs:—The right large chela in contact with the ground, with which it has been brought in contact as much to the left as possible, acting chiefly as a support to the body and as a sort of fulcrum upon which the body will move to the left, rather than as an active agent propelling it in a given direction—an exceedingly powerful locomotive engine. The other limb in action on this, the right side, will be the third counting from the chela, the second being raised. On the left side there will be only one limb in action, viz. the next following the small chela. In the last phase of locomotion there will be two limbs pulling on the left and one pushing on the right.

A crab in which I believe similar features would be met with is one which, unfortunately, is very rarely found on this coast, although specimens are occasionally taken, and one presenting some exceptionally curious features was some time since obtained somewhere on the Cornish coast near Penzance, as I am informed by my friend Mr. Tregellis. It is a little crab which is known as *Dromia*. It is a slow-moving species, with short limbs, and the two hind pairs of limbs are always carried bent up over the back, where they are employed to hold on either some pieces of a compound ascidian or a piece of sponge, which are used mainly for concealment, by obscuring the outline of the body of the crab, but in part also to scare away animals that would otherwise prey upon it. Both sponges and compound ascidians are extremely distasteful to most

marine animals, so that by carrying them on its back this crab succeeds in a very remarkable manner in securing both self-concealment and self-preservation. The two hind limbs of this crab, then, being used for this particular purpose, cannot be engaged for locomotion, so that, like the Hermit Crab, it is reduced to a four-limbed condition, and I believe—although this is only a matter of inference—that by its use of the chelæ it is converted practically into a hexapod, as in the case of the Hermit Crab. The creature in question is very common in the Mediterranean, and is I am told constantly to be seen in the Naples Aquarium, but unfortunately that is a long way off, and I have not as yet had an opportunity of watching its movements. But the example of *Dromia* which was met with on the Cornish coast was peculiar in having adopted for its concealment a very unusual device. It had not taken hold of a sponge or a *Botryllus*, but a water-logged piece of cork, probably cork from a fishing-net, and had either excavated it so as to fit its back, or the piece of cork naturally did so; and this piece of cork it was holding firmly upon its back—a curious and unusual protective covering.

In order that my remarks may not be too monotonous and too "crabbed" (if I may use the observation), I will pass on to just a couple of instances which are noteworthy among the Gasteropod Mollusca.

Whilst staying at Plymouth, I was shown a certain mollusc which had been found there in tolerable numbers, and upon which Mr. Garstang (a friend connected with that laboratory) had made some interesting observations. The mollusc in question, a gasteropod, is one of those which walk upon the flattened expanded ventral surface of the foot, and is known as the *Oscanius*, or *Pleurobranchus* of some authors. It is about the size of half-a-crown, and with much the same outline. It has a very flattened body, notched in front and expanded. The actual body of the creature is often thrown into folds, and its upper surface is more or less warty and coloured with blotches of purple-brown. In front of its body on each side, and of course above the foot, is a notch in the mantle-surface, in which is a more or less concealed tentacle having a little eye-spot close to its base. Now, on the right-hand side in the interval between the mantle-border and its foot—when this mantle-border is turned up so as to show it—we find concealed underneath a curious cone-like ctenidium or gill, and in front of this an organ, which is the external genital organ. Under ordinary circumstances this *Oscanius* crawls about by wave-like contractions of the foot, similar to those which may be readily seen in the common Snail, commencing at the posterior border and passing one after the other towards the anterior border. As the result of these contractions, it glides in a perfectly uniform smooth fashion over the seaweeds or rock

over which it may be making its way. It occasionally (especially when only half-grown) indulges in another mode of locomotion. It ceases to glide and to hold on by its ventral surface, and then there is a momentary flexure of one half of the foot—we will say the right half of the foot is suddenly bent bodily towards the middle line, carrying with it to a certain extent the body above, bent in a ventral direction. This sudden bending towards the middle line, the result of the stroke which as it were it gives the water, will cause the animal to heel over to the opposite side. This will be alternated: first the right and then the left half of the foot will thus bend towards the middle line, so that with a sort of rocking, heaving motion this gasteropod will gradually work its way up the water, and will maintain itself, according to the rapidity of its strokes, at a certain level. Not only does it move in this way, raising itself in the water, and being carried, perhaps, by the currents to a distance, but it actually sometimes moves through the water in a horizontal way, because at the same time that these contractions of the right and left halves of the foot are going on the margin of the foot is undergoing a wave-like contraction from before backwards, and these ripple-like, wave-like contractions from before backwards act as a forward propeller of the body, just in the same way as we see a Sole, or one of the great Rays, swimming by a ripple-like undulation passing from the anterior border of its fins towards the posterior border; so that in like manner the mollusc will glide forwards by the ripple-like motion of its foot-margin, and at the same time it will raise itself by the flapping movements, as it were, now of this, now of that side of its foot. This, then, is an exceptional way for an ordinary gasteropod to move.

There is another gasteropod which I will mention that has an extraordinary way of moving, fitting it, however, most admirably to the conditions of its existence. It is unfortunately one we shall never see alive at the Marine Biological Station at Plymouth, for, being a tropical form, it is not found alive on our coasts. I only mention it because there are so many features in its structure which are of interest. The species in question inhabits a shell in the form of a very flattened cone. From the mouth of this shell there protrudes that which increases the size of the shell by secretion from its outer surface, namely, a sort of fleshy mantle-lobe which extends beyond the margin of the mouth, and then from the mouth of the shell, when the thing is actively moving, there passes down a cylindrical body; and in front of this cylindrical body we see the head-region with an everted proboscis and a couple of filamentous tentacles, with a bright little eye at the base of each; and below, ventrally, we have the foot, consisting of two divisions—the *propodium* or anterior division, and the *mesopodium* or middle division. Then there is a third, or posterior, division of the foot—

a large lobe which extends behind and bears upon its upper surface posteriorly that little horny secretion which furnishes a sort of lid for closing the mouth of the shell when the animal has retracted itself under its protection. Now this creature (*Xenophora*) crawls about invariably upon what is called a rubbly bottom, that is to say, upon the bottom of the sea, where the surface is mainly composed of fragments of coral, bits of stone, and objects of that description. Now if this *Xenophora* had a smooth sucking-foot upon which it had to glide, as in the case of *Oscanius*, it would be very badly off indeed: it would have to go up and down, as it were, these enormous boulders: and it would be in much the same condition as a man would be who had to make progress over boulders which were perhaps three or four times his own height. His progress would be a very slow and altogether a very tedious business. But this *Xenophora* gets over the trouble very easily indeed, because its foot, which is fairly long and narrow, is simply extended until one end touches a given stone, the other end holding on to the pebble or stone behind, and when it has got a good hold in front, it lets go its hold behind, and draws the posterior end towards the anterior and fixed end. So that the foot is formed into a sort of loop; and thus by a series of steps, as it were, it strides from rock to rock, instead of going up and down in the intervals between them. Now whilst this procedure is going on as its normal locomotive business, we find other curious features, especially when it is not crawling, but when it is resting. We find that this mantle-lobe, which is protruded from the mouth of the shell for the purpose of increasing the size of the shell by secreting fresh material to its margin, is also doing something else. This mantle-lobe picks up in the migration of the creature bits of stone, shell, or coral, and holds them quite firmly. It holds these fragments there quite steadily until, by secreting the proper shelly substance on the under surface of the piece of stone or shell, it cements this to the outer surface of its own shell, which also it is building up by secretion; thus, by the continuance of this process, we find that the animal conceals itself in the well-known fashion by means of masses of stone and shell cemented to its abode—entirely concealing its form and its identity, so that, when resting, no one would recognize this as a living creature, and would simply imagine that it was a little aggregation of shells or rubble, such as might be seen present all round it.

Here we have in these two forms, both belonging to the common group of Gasteropods, two extreme modifications of foot-structure. Of course there are other forms equally remarkable amongst the Mollusca, and many especial modifications for locomotive purposes; but these two I have mentioned simply because one was obtained where I was investigating the movements of crabs and other creatures. Of course there were many other forms which came under observation at the same time; but in

the brief period now at my disposal it would be impossible to speak of them.

It only remains for me to thank you for the kind way in which you have listened to these few remarks, and to bring them to a conclusion.

Dr. D. H. Scott then moved the following resolution, viz.: "That the thanks of the Society be given to the President for his excellent Address, and that he be requested to allow it to be printed." This, having been seconded by Mr. Howard Saunders, was carried unanimously.

The Linnean Gold Medal for the year was then awarded to Prof. Ernst Haeckel, M.D., Ph.D., of Jena. In the absence of the recipient, Mr. W. Percy Sladen received the Medal on his behalf, and read a letter from Prof. Haeckel, acknowledging the honour done him by the Society.

In announcing the presentation the President said:—

There is probably no name which is more familiar to zoologists in all parts of the world, or held in higher esteem, than that of Ernst Haeckel, and it is with feelings of great satisfaction and especial pleasure that I have the honour of acting on your behalf, and sending him the Gold Medal of our Society.

Whether we consider the number of Professor Haeckel's contributions to zoological science—there are at least 67 monographs and separate memoirs—or the marvellous ability and clearness with which he has recognized the relative values of the different facts, as shown, for instance, in such works as his General Morphology and many papers dealing broadly with natural science —or, again, the beauty of those classical monographs in which he has dealt with such difficult subjects as the various groups of *Medusæ*, forms so difficult to preserve, and yet in his able hands pourtrayed with such skill that we can almost see them, as it were, living once again upon his pages, moving with all that grace which they display in their natural element the sea, and adorned with those lively colours with which we are so familiar,—we cannot but admit the importance and scientific value of his labours. Again, look at the series of monographs he has given us of such forms as the *Radiolaria*—how difficult would it be to most men to illustrate such a group, wherein we find the most perfect symmetry, only to be pourtrayed by the most complete and thorough knowledge of the laws of perspective and fore-shortening. How admirably has that work been carried out by Professor Haeckel! But to enumerate his various works, and the peculiar charm they have for us, would be, I feel, altogether an unnecessary task. You must all know full well how greatly we are indebted to him for very much of our knowledge of marine zoology, and for many philosophical ideas upon these and other kindred subjects. I need not say more, but will simply,

by your authority, hand over the Medal to Mr. Sladen, on his behalf. Unfortunately, Professor Haeckel is not here to receive it himself, and we are denied the pleasure of meeting him, which we had hoped, perhaps, to have had. I therefore hand to Mr. Sladen this Gold Medal for transmission to Professor Ernst Heinrich Philip August Haeckel, M.D., Ph.D., Professor of Zoology and Director of the Zoological Institute at the University of Jena.

Mr. Sladen.—Mr. President and Gentlemen, Professor Haeckel has done me the honour of asking me to receive this Medal on his behalf. I regret that his academic duties in Jena prevent his being present at this meeting, and I am still more sorry to say that the after-effects of a serious attack of influenza would, irrespective of his duties, have rendered it inadvisable for him to undertake just now so long a journey. I shall have much pleasure, Sir, in conveying to him the expression of your appreciation of his scientific work, and I beg permission to read an Address which he has sent to me, as follows :—

"Mr. President and Gentlemen,

"By your decision to bestow upon me your Gold Medal, in acknowledgment of my scientific work, you have honoured and gratified me exceedingly; and I find it difficult to express in a sufficient manner my hearty thanks.

"It is true that my constant aim during a literary life of forty years has been to advance, according to my ability, Biological Science—which the Linnean Society fosters,—and especially Zoology—and to bring its great problems nearer to monistic solution. My talents, however, do not correspond to my aims, and hence my actual attainments remain far behind my endeavours. I fully recognized this fact on the 16th of February last, on completion of my sixtieth year, when numerous marks of honour—and among them some from Great Britain—fell to my lot.

"I could not help remembering with thankfulness on that occasion the many favourable circumstances which have enabled me to take my share of the great biological work of the second half of our century, and to attain some success therein. Among these favourable 'conditions of scientific work,' I considered it the most favourable that the commencement of my independent work coincided with the grand reform of biological science, which was inaugurated 35 years ago by the greatest naturalist of the nineteenth century—Charles Darwin. I belonged at that time to the few young naturalists who at once perceived the far-reaching bearings of the 'Origin of Species,' and who endeavoured to push on this great advance of the Development Theory. When I began my academic life in Jena in 1861, I at once availed myself of the theory of Descent as the basis of the new Zoology; and all my later work has been followed out on this monistic basis.

"My full conviction of the truth of the Development theory was definitely confirmed when I visited England for the first time in 1866, and had the fortune of becoming personally acquainted with such renowned British naturalists as Charles Darwin, Charles Lyell, Thomas Huxley, and others. Especially invaluable to me was the exchange of ideas, when I visited Down, near Beckenham, and was able to draw a fund of information and suggestion from the rich imagination of my unattainable master and model, Charles Darwin.

"After attempting, in my 'General Morphology' in 1866, to show the most important bearings of Darwin's theory upon Comparative Anatomy and Embryology as a whole (so as to explain Ontogeny through Phylogeny), I endeavoured for the next ten years to establish on a firm basis the network of causation underlying these two sciences; and to demonstrate the unity of embryonic formation throughout the whole kingdom of the Metazoa, by the application of the principle of biogenesis to the theory of germinal layers. In this research I was guided by the ingenious comparison which Prof. Huxley had drawn in 1848 between the two germinal layers of Vertebrates and the two simple layers of cells of which the body of Medusa is built up. It proved an especial pleasure to me that almost contemporaneous with my Gastræa theory (1872) one of the most distinguished young British naturalists, Prof. E. Ray Lankester, grasped—independently of me—the same idea.

"In another sphere—the interesting classification of the Rhizopoda—I came into close and friendly intercourse with one of the first specialists of these remarkable Protozoa, the late Dr. William B. Carpenter.

"In 1876, on the occasion of my first visit to the British Association, in Glasgow, I came into still further relations to British Biology, which have proved most successful and fortunate for me. The Naturalists of the 'Challenger' (which had just returned from its four-years' glorious voyage round the world) were there exhibiting the wonderful collections of their Deep Sea soundings, and among them the fabulous new world of the 'Radiolarian ooze.'

"As I had published a 'Monograph of the Radiolaria' in 1862, the working out of this rich material was entrusted to me by the Director of the 'Challenger' Staff, Sir Wyville Thomson; and after his death, this and other new material was placed at my disposal in the most liberal manner by his successor, Mr. John Murray. The result was, that for thirteen years I was engaged almost entirely on the working up of the 'Challenger' material; and I had thus the good fortune of describing a great number of new Radiolaria, Sponges, Medusæ, and Siphonophora in this monumental work of the British nation, and of applying in their systematic arrangement the phylogenetic principles of Darwin's theory.

"I have thus been enabled during the course of thirty years to come into closest contact in many ways with British Science. I treasure this good fortune so much the more, as the means by which I have gained a great number of dear personal friends, through whose intercourse and incitement my scientific labour has been greatly advanced.

"The near racial relations of the British and German mind, especially the intimate phylogenetic connexion between the universally dominant 'Anglo-Saxon' race and the primeval continental 'Palæo-Saxon' race from Thuringia, to which I myself belong, have daily assumed in my eyes more significant form, during this continued scientific and personal intercourse. There have hovered before me, as the highest human ideals, those two great intellects, one of whom in the eighteenth, and the other in the nineteenth century had climbed the highest peaks of natural philosophy—Wolfgang Goethe and Charles Darwin. Upon the intimate relation between these two great intellects of the Germanic race, I have repeatedly laid stress.

"In the history of human knowledge, the second half of the nineteenth century will certainly be always honoured as one of the most important periods; the advances of our time in all spheres of Natural Philosophy, as well as in their practical application, are so prodigious that no earlier period in the history of civilization can compare to it.

"However highly we may value the discoveries of Physics and Chemistry, of Astronomy and Geology, of Botany and Zoology, above all in my opinion stands the recognition of *Monism*: that one great fundamental law of mechanical development which dominates the whole universe,—that one continuous chain of causation which surrounds the whole organic and inorganic world. What Newton's law of gravitation has proved for the whole universe, Lyell's theory of Continuity has been acknowledged to be for Geology, and Darwin's theory of Descent for Biology.

"If the Linnean Society, through the award of its Gold Medal, pronounces its high recognition of my modest share in the transmission of this great principle, I shall always be most gratefully beholden to it. I shall hope to prove this best by constantly endeavouring, for the remainder of my life, after the model of those great heroes, '*rerum cognoscere causas*'!"

The obituary notices of deceased Fellows and Foreign Members were then laid before the Meeting by the Senior Secretary.

Obituary Notices.

Pierre Joseph van Beneden was born at Malines on December 19th, 1809. He received his early education in his native town, and in 1831 proceeded to the University of Louvain, and graduated there as Doctor in 1833. Having shown a strong taste for Natural History, and especially Zoology (derived in a great measure from his excellent teacher M. Stoffels, a chemist), he was appointed Curator of the University collections. He next spent two years in Paris, and visited many places in France and Italy, with a view of extending his knowledge of marine zoology. In 1835 he was appointed assistant Professor in the University of Ghent, a post which he resigned in the following year in favour of the chair of Zoology and Comparative Anatomy in the University of Louvain, a professorship which he continued to fill for 57 years, until the end of his life.

Van Beneden was a man of remarkable industry, embracing within his studies nearly every branch of the animal kingdom, and upon most of which he has published memoirs. Among his more important works may be mentioned the 'Natural History of the Freshwater Polyzoa' (published in conjunction with Du Mortier, in 1850); the 'Zoologie Médicale' (in conjunction with Paul Gervais, in 1859); the 'Recherches sur la Faune Littorale de Belgique' (Polypes) in 1866. He also wrote many papers on parasitic worms and annelids; and the problems presented by the new discoveries illustrative of "alternation of generations" and "commensalism" were subjects in which he took especial interest; besides these, he was also the author of a considerable number of palæontological papers. Van Beneden was a member of many of the Academies and Societies of Europe, and an honorary LL.D. of the University of Edinburgh. He was a Foreign Member of the Royal and Geological Societies, and was elected a Foreign Member of this Society in 1854. He died at Louvain on January 8, 1894.

Dr. George Bennett passed nearly the whole of a prolonged and active life in Australia, where he settled more than half a century ago. He was born at Plymouth on January 31st, 1804, and had but just left school when, at the age of 15, he made a voyage to Ceylon. Returning to England, he studied for the medical profession, and in 1828 became M.R.C.S. Soon after this he entered as surgeon of a merchant vessel, and in the course of the voyage he visited Australia, and made some investigations into the peculiar mammalia of that continent. He revisited the Colony in 1832 for more detailed study of the interesting features of the fauna which he had failed to achieve when previously there; and after his return he published the results in his well-known volumes, 'Wanderings in New South Wales, Batavia, ... and China, being the Journal of a Naturalist in these countries in 1832–34,' Lond. 1834, 8vo, in which year also he issued his

notes on the habits of the *Ornithorhynchus paradoxus*. In 1836 he settled in Sydney, where he soon acquired a large practice, but still found time to continue his natural history studies. He was the first to discover the Nautilus in a living state, and sent the specimen to Prof. Owen. A founder of the Australian Museum, he later on became its secretary, and then a member of the board of management when trustees were appointed. He received the degree of M.D. from Glasgow in 1859, published his 'Gatherings of a Naturalist in Australasia' in 1860, 'Acclimatization' in 1862, 'A Trip to Queensland in search of Fossils' in 1871; and in the last-named year also 'The Introduction, Cultivation, and Economic uses of the Orange and others of the Citron tribe,' Sydney. Besides these volumes, he had issued many papers of biologic interest in the journals of the medical profession.

For some time before his death he had suffered from bronchitis, and, after falling into an unconscious state for several days, he passed away at Sydney, 29th September, 1893, aged 89.

He was married three times, and left a widow and three sons. During his long career he had amassed a large library, which it is believed has been left to the University of his adopted city. His connection with this Society dates as far back as Dec. 20th, 1831, and he was also a member of the Zoological and other Societies.

Professor Robert Bentley was born at Hitchin in 1821, and on leaving school was apprenticed to a chemist at Tunbridge Wells; after serving his time he entered the establishment of Bell and Co., Oxford Street. He was one of the first Associates of the Pharmaceutical Society, and when the School was started at 17 Bloomsbury Square, he attended a course of lectures given by Dr. A. T. Thompson, and gained the first botanical prize awarded by the institution, a source of great pride to the youth both then and afterwards. Having matriculated at London University, he entered as medical student at King's College, in course of time becoming a member of the College of Surgeons. He became Professor of Botany at King's College, and held a similar appointment at the School of Pharmacy in Bloomsbury Square, retaining these till within a short time of his decease. His most important work was his 'Manual of Botany,' London, 1861; the edition of 1887 being especially noteworthy for the pharmaceutical portion. He was associated with Dr. H. Trimen in the publication of 'Medicinal Plants,' 1875–80, and for ten years he edited the 'Pharmaceutical Journal.'

He died 24th December, 1893, and was buried at Kensal Green.

Although his connection with the Linnean Society dated from April 3rd, 1849, he rarely attended any of the meetings of the Society, his attention being devoted to the Materia Medica.

The Rev. Leonard Blomefield (originally Jenyns) was the son of the Rev. George Leonard Jenyns, of Bottisham House, Cambridgeshire. He was born in London on the 25th May, 1800, and was sent to school at Putney preparatory to going to Eton in 1813. He graduated at St. John's College, Cambridge, in 1822, and was ordained in the following year to the curacy of Swaffham Bulbeck, in Cambridgeshire, to which living he was presented five years later. Here he resided for 30 years, until obliged to resign in consequence of his wife's health.

Even as a schoolboy young Jenyns was a devoted lover of Nature, collecting insects and studying birds and their habits in his leisure, and devouring all the books on travel and natural history he could meet with—a taste which he attributed in a large measure to the influence of his uncle, Mr. Chappelow.

In the midst of his parish work in Cambridgeshire, Mr. Jenyns found opportunities of making collections of Insects, British birds' eggs, crania of the smaller Mammalia, Land and Fresh-water Shells, and Plants.

He was the author of an excellent monograph on *Cyclas* and *Pisidium*; 'A Manual of British Vertebrate Animals,' which is still considered at the present day a useful text-book; 'An Account of the Fishes collected during the voyage of the Beagle,' a work undertaken on the special invitation of his friend Mr. Darwin; in 1846 appeared his 'Observations in Natural History, with an Introduction on Habits of Observing, and a Calendar of Periodic Phenomena in Natural History,' and in 1858 his 'Observations in Meteorology.' In addition to these works he contributed a number of papers to various scientific societies, and maintained an active interest in all that pertained to the study of Nature to the end of his life.

Mr. Jenyns assumed the name of Blomefield in 1871, on succeeding to the property of Francis Blomefield, the historian of Norfolk, with whom he was distantly connected.

At the date of his death he was the oldest Fellow of this Society, having been elected in 1822. He was an original member of the Zoological Society (1826), of the Entomological Society (1834), and of the Ray Society (1844), was elected Fellow of the Geological Society in 1835, and joined the British Association in the second year of its existence (1832). He was the founder of the Bath Natural History and Antiquarian Field Club in 1855, of which he continued to be an active supporter until quite recently. He had resided in Bath for nearly 40 years, and died there on Sept. 1st, 1893, in his 93rd year.

John Charles Bowring was the eldest son of the late Sir John Bowring, the eminent philologist and diplomatist, whose associations with China and Siam are a part of our political history. Mr. Bowring was for some time connected with the China trade, being a partner in the well-known firm of Jardine, Matheson,

and Co. He was an able and enthusiastic entomologist, and formed a large collection of Coleoptera, but he did not contribute any communication to this Society upon the subject of his studies. He was elected a Fellow in 1873. He died at his residence in Windsor Forest, June 20th, 1893, aged 72.

George Brook, of Huddersfield, the third successive bearer of the name, was born on March 17th, 1857. He was educated at the Friends' School, Alderley Edge, and afterwards studied for a couple of years at the Owens College, Manchester, before joining his father in business at Huddersfield.

The development of his taste for Natural History was due in a great measure to his association with the late Mr. Jas. W. Davis, of Halifax, and the small circle of friends who were at that time interesting themselves in biological research and the investigation of the Fauna and Flora of the W. Riding of Yorkshire.

Being especially attracted by the charms of marine zoology, Brook had an excellent aquarium constructed at his home in Huddersfield, and was there able to carry out a series of careful studies of the habits and development of a number of animal forms, but chiefly fishes and crustacea, the latter being the group to which he originally determined to devote himself specially.

Having decided to relinquish business pursuits, he was appointed in 1884 lecturer on Comparative Embryology to the University of Edinburgh—a position he continued to occupy until his death. From 1884 to 1887 he held the post of scientific assistant to the Scottish Fishery Board, in which capacity he did excellent work, and published a number of valuable notes and reports upon food-fishes.

In 1889 he drew up a masterly report on the Antipatharia of the 'Challenger' Expedition—a work which has been spoken of as "one of the most praiseworthy" memoirs of that great undertaking. This led to his engagement in 1890 by the Trustees of the British Museum for the arrangement and cataloguing of their large collection of Stony Corals. The first instalment of this work, entitled a 'Catalogue of the Genus *Madrepora*'—a large quarto volume with 35 beautiful plates—was only published within a week of the Author's death. It is a monument of careful and painstaking investigation, which ranks its author among the foremost of Actinologists, and emphasizes the loss which British Zoology has sustained in his early death.

In addition to these larger works, Mr. Brook communicated a number of papers to different scientific societies—several being printed in our own Journal.

He was Secretary to the Huddersfield Naturalists' Society, and to the Scottish Microscopical Society, of which he was a founder. He was for three years a Vice-President of the Royal

Physical Society of Edinburgh, and was a Fellow of the Royal Society of Edinburgh and of the Zoological Society.

He was elected a Fellow of this Society in 1879, in 1892 a Member of the Council; and he died suddenly on August 12th, 1893, from the effects of heat-apoplexy whilst out with a shooting-party on the moors near Newcastle-on-Tyne.

His untimely death, at the early age of 36, robs British science of a promising naturalist, whose self-taught knowledge, clear judgment, and bold independence, enlisted the admiration, as well as the affection of a large circle of friends.

Dickinson Webster Crompton, the son of a notable Birmingham merchant, was born at Birmingham on Sept. 30th, 1805. He was educated at the Unitarian school of the Rev. J. W. Currie at Woodville, near Sandwell, and being destined for a Surgeon he was sent in due time to the General Hospital as a pupil under Dr. Mole, the Senior Physician, and was afterwards apprenticed for five years to Mr. Richard Wood, then the Senior Surgeon. At the end of this term young Crompton entered himself as a student at Guy's Hospital; and from Guy's he went to Paris, and studied anatomy for some months under the celebrated Baron Dupuytren. Returning to England in 1829, he passed the necessary examinations and became a member of the College of Surgeons and the Apothecaries' Company. In 1834 he took the Jacksonian prize for an essay on "Diseases of the Nose and Face;" and in 1843 he was elected an Honorary Fellow of the College of Surgeons.

On returning to Birmingham, he began practice as a Surgeon, and, after filling several minor appointments, he was ultimately elected Senior Surgeon to the General Hospital in 1852, a post which he held until 1868, when he resigned in order to confine himself to private practice.

Mr. Crompton's life was a purely professional one, and, with the exception above mentioned, we are not aware that he contributed to Medical or Scientific literature. He was regarded as a most competent surgeon, and was especially successful in operations for the relief of Stone.

He was elected a Fellow of this Society in 1830. He died at Birmingham on March 30th, 1894, in his 90th year.

James William Davis was born at Leeds on the 15th of April, 1846, and was educated at the grammar school of that town. At an early age he went into his father's business—that of cloth-dyeing, and in due time became a partner. About 1864 the firm removed to Greetland near Halifax, a step which was speedily followed with most successful results, under the judicious and able management of young Davis.

From earliest boyhood Davis showed an ardent taste for Science, and especially Natural History; even before leaving

school he was an enthusiastic collector; and when only 14 years of age was made Secretary of the Leeds Naturalists' Society.

In Halifax his scientific studies were more systematized, he attended lectures on Chemistry, and in conjunction with a few friends carried out a course of practical work in Comparative Anatomy. Geological and Palæontological subjects were, however, those which offered the greatest attraction to his mind, and as a student of fossil fishes he has made a well-deserved reputation—a list of 56 papers and memoirs, which have appeared in various publications, being given in the Geological Magazine for Sept. 1893. Among the more important of these may be mentioned his monographs, "On the Fossil Fishes of the Carboniferous Limestone Series of Great Britain" (1883); "The Fossil Fishes of the Chalk of Mount Lebanon in Syria" (1887); "On the Fossil Fish-remains from the Tertiary and Cretaceo-Tertiary Formations of New Zealand" (1888); "On the Fossil Fish of the Cretaceous Formations of Scandinavia" (1890); "On the Fossil Fish-remains of the Coal-Measures of the British Islands, Part i. *Pleuracanthidæ*" (1892). He was also the author, in conjunction with Mr. F. Arnold Lees, of 'West Yorkshire: an account of its Geology, Physical Geography, Climatology and Botany' (London, 1878).

In addition to his own work, Davis was an enthusiastic supporter of everything that tended to the advancement of Science in his native county, and it was owing to his exertions, and able administration as Secretary since 1876, that the Yorkshire Geological and Polytechnic Society has attained its present state of prosperity and number of members. A history of the fifty years' existence of the Society was written by him in 1889. He was also an active member of the Yorkshire Naturalists' Union, of the Halifax Literary and Philosophical Society, and of many other local Societies.

He was well known throughout Yorkshire as an energetic advocate of technical education, and was for many years connected with several of the local Mechanics' Institutions and Fine Art Societies. He was elected a Governor of the Yorkshire College at Leeds, and took great interest in all that pertained to its welfare.

Always a prominent public man, Mr. Davis was elected Mayor of Halifax in November 1890, a compliment repeated by his fellow townsmen in the two following years.

Mr. Davis was a Fellow of the Antiquarian and Geological Societies, and served on the Council of the latter for two years. He was elected a Fellow of this Society in 1875. He died, the victim of over-work, at Grasington in North Yorkshire, on July 21st, 1893, at the early age of 47. A true Yorkshireman, an enthusiastic worker, and a firm friend!

Arthur Milnes Marshall was born at Birmingham on June 8th, 1852, being the second son of Mr. W. P. Marshall, C.E.

a gentleman distinguished as an engineer and an enthusiastic naturalist. From a private school, he entered St. John's College, Cambridge, in 1871, and graduated as Senior in the Natural Science Tripos of 1874. He then studied for some months in the Zoological Station at Naples, and returned to Cambridge, where for two years he assisted the late Prof. F. M. Balfour in organizing the newly established classes of Comparative Morphology. In 1876 he obtained the entrance scholarship in Natural Science at St. Bartholomew's Hospital; and in 1879 was appointed Beyer Professor of Zoology in Owens College, Manchester.

He was the author of a valuable series of memoirs on the Cranial Nerves, published between the years 1877 and 1881; and also wrote a number of very carefully worked out papers on the Pennatulidæ, and an able memoir on the nervous system of *Antedon*.

Prof. Marshall was a successful and deservedly popular teacher, his clear insight into, and mastery over, the difficulties which beset the acquirement of technical knowledge rendering him especially competent as a lecturer and writer. His text-books on Vertebrate Embryology, the Frog, and (conjointly with Mr. Hurst) on 'Practical Zoology,' will bear permanent testimony to his ability.

His capacity for organization and administrative work was equally remarkable. He was an enthusiastic supporter of the British Association, and it is fully acknowledged that the great success which attended the Manchester meeting was mainly due to his efforts as local secretary. He was an ardent worker for the progress of the Victoria University, and as Secretary, and afterwards Chairman, of the Board of Studies he rendered invaluable aid in the early days of that institution.

He was elected a Fellow of the Royal Society in 1885, and served upon the Council for the years 1891–2. He was elected a Fellow of the Linnean Society in 1891.

Prof. Marshall's death, which took place on the 31st December, 1893, resulted from a fall down a precipice on Scawfell. The scientific world loses in him a brilliant student, and his friends one of those rare spirits whose presence always stimulated, and whose geniality never changed.

Francis Polkinghorne Pascoe was born at Penzance on September 1st, 1813. He was educated at the grammar school of that town, and subsequently studied medicine at St. Bartholomew's Hospital. Having obtained his M.R.C.S. in 1835, he was shortly afterwards appointed Surgeon in the Royal Navy, and served on the Australian, West Indian, and Mediterranean stations. He retired from the service in 1843, married, and settled near St. Austell. Being left a widower in 1851, he removed to London and devoted himself to Natural

History. Though a philosophic naturalist in the wide sense of the term, his favourite study was entomology, the Coleoptera being the group to which he gave especial attention. Upon these forms he published a large number of papers, his memoir on the 'Longicornia Malayana,' describing the species collected by Wallace, being one of the most important. He was also the author of a well-known work on 'Zoological Classification,' and of a number of brochures and small books bearing on Zoology and the Darwinian theory. He had travelled much, and had amassed a large collection of Coleoptera, which is now preserved in the British Museum and is said to include above 2500 type specimens.

He was a Fellow of the Entomological Society, and was President in 1864–65. He was also a Member of the Entomological Societies of France, Belgium, Stettin, and of other Foreign Societies. He served for many years on the Council of the Ray Society, and on the Scientific Committee of the Royal Horticultural Society.

He was elected a Fellow of this Society in 1852. He died somewhat suddenly at Brighton on June 20th, 1893.

George John Romanes, the son of the Rev. Prof. Romanes, was born in Kingston, Canada, on May 20th, 1848. In 1867 he entered Gonville and Caius College, Cambridge, took honours in the Natural Science Tripos in 1870, and was Burney Prize Essayist in 1873.

Among his first important work we find a series of papers on the primitive nervous systems of the Medusæ and Echinodermata, published in the 'Philosophical Transactions.' It was, however, to Psychology in its broadest aspect, and the application thereto of the doctrine of Evolution, that Romanes devoted his vigorous and accurately trained intellect. His powers of careful observation, his methods of accurate experimentation on the side of physiological research, and his profound knowledge of general philosophical writings, singularly fitted him as a critic and an expositor.

He was an industrious and prolific writer, and in addition to a large number of papers, essays, and controversial articles published in various magazines, reviews, and journals of learned societies, he was also the author of the following well-known books:—'Animal Intelligence,' 'Mental Evolution in Animals,' 'Mental Evolution in Man,' 'Jelly-fish, Star-fish, and Sea-urchins,' 'Darwin and after Darwin,' 'An Examination of Weismannism."

He was elected a Fellow of the Royal Society in 1879, and was twice appointed Croonian Lecturer. He was also a Fellow of the Zoological Society. He was Fullerian Professor of Physiology in the Royal Institution, Rede Lecturer in the University of Cambridge, and Rosebery Lecturer in the University of Edinburgh. He was an honorary LL.D. of the University of Aberdeen and a member of the Council of University College, London.

He was the founder of the Romanes Lectureship at Oxford, and nominated the first three lecturers, viz. :—the Rt. Hon. W. E. Gladstone, the Rt. Hon. T. H. Huxley, and Dr. Weismann.

He was elected a Fellow of this Society in 1875, and served as Zoological Secretary from 1881 to 1885. He removed from London to Oxford in 1890; but his health for nearly three years had been a source of gravest anxiety to his friends, and he passed away on May 23rd, 1894, only three days after the 46th anniversary of his birthday.

His genuine disposition, his wide range of sympathies, and his unalloyed goodness of heart, endeared him to a large circle of friends, who mourn his loss and will cherish his memory.

In the death of Richard Spruce the Society has to deplore the loss of the most distinguished botanist and explorer who has joined the majority within the past twelve months. He was the son of the village schoolmaster of Ganthorpe, Terrington, in the North Riding of Yorkshire; was born in that place on September 10th, 1817, and, having shown capacity for mathematics early in life, was appointed on the staff of St. Peter's Collegiate School at York. He devoted his leisure time to the study of the plants of his native county, and in 1841 his first publication appeared in the first volume of the 'Phytologist,' being an account of the mosses and liverworts of Teesdale, a rich district which was practically opened up to bryologists by his efforts. The following year he paid a visit to Dr. Thomas Taylor in Ireland, and to this visit may be attributed much of the permanence of his devotion to the Muscineæ, which closed only with his life. The same year also witnessed his election as a Fellow of the Botanical Society of Edinburgh, in whose 'Transactions' much of his bryological work was issued. Short papers on the mosses and hepatics of Eskdale and Teesdale appeared in the 'Phytologist' and the 'Annals and Magazine of Natural History' in 1844, and in 1845 he printed a list of all the species known as occurring in Yorkshire (Phytologist, ii.). His health being indifferent, he started on an expedition to the Pyrenees, where he spent a year, collecting both flowering and cryptogamic plants: a description of his experiences will be found in the 'London Journal of Botany,' 1846, in three letters to Sir William Hooker. On his return he issued his Pyrenean plants in sets, and described his novelties in the 'Annals and Magazine,' 1849–50, and the Edinburgh Botanical Society's 'Transactions,' 1850, which showed most conspicuously his merits.

As soon as the last part of the foregoing was published, Mr. Spruce sailed from Liverpool for South America on June 7th, 1849, to collect from that rich region, his expenses being defrayed by a small association of botanists with Sir William Hooker and Mr. Bentham at their head, the latter of whom undertook to receive the plants provisionally, name them, distribute them, and collect the subscriptions, acting, in fact, as his agent. On

July 12th Spruce had reached Pará, and began making those splendid collections, which ultimately attained the large number of 7000 flowering plants alone, and have added so much to our knowledge of the vegetation of Equatorial America. He spent three months in the vicinity of that port, and then went up to Santarem at the mouth of the Tapajos, where he fell in with Dr. Alfred Russel Wallace. In November he went seventy miles farther up to Obydos, and thence explored the Trombetas and its tributary the Arepecuru as far as the cataracts of the latter in lat. 0° 47′ N., fixing five latitudes by astronomical observation, and mapping those previously unknown rivers. He returned to Santarem in January 1850, and made that place his headquarters till the following October, when he left it for the Barra do Rio Negro, arriving there after a voyage of 63 days, 30 of which were spent in the channels of the great island of Tupinambarana. Here he remained the greater part of 1851, and in November he started for the head-waters of the Rio Negro in a boat of nine tons' burden, which he had fitted up expressly for his collecting. Early in the next year he reached the village of São Gabriel, and after staying there seven months he proceeded up the large river Uapés, which till then had hardly been known even by name to Europeans. He found his efforts well rewarded by a rich harvest, and remained in this region till March 1853, when he sailed out into the Rio Negro and up that river beyond the Brazilian frontier as far as San Carlos del Rio Negro, making this village his headquarters during his stay in Venezuela, which lasted until November 1854. Whilst here he made two expeditions to the Orinoco, one by way of the natural canal of the Casiquiari, and the other by the portage of Pimichin and the Atabapo, exploring the river Pacimoni to its source among lofty and picturesque mountains, and mapping it as well as the Cunucunuma. He came down the Rio Negro to the Barra do Rio Negro about the end of 1854; then, availing himself of the newly established service of steamers on the Amazon, he went to Nauta in Peru, near the mouth of the Ucayali, thence by canoe up the Marañon and its affluent the Huallaga to Tarrapota, where he stayed nearly two years, collecting there, in addition to other plants, 250 species of ferns in an area of 50 miles in diameter. In March 1857 he left for Ecuador, going down the Huallaga to its junction with the Marañon, then ascending the latter river to Canelos, finally through the forest of Canelos on foot to the village of Banos, at the foot of the volcano of Tunguagua. In this journey he was compelled to abandon his collections in passing the swollen river-tops, to escape perishing of hunger, but happily recovered the bulk afterwards. He stayed here six months, and in January 1858 removed to Ambato, making that his centre for excursions for more than two years, including excursions to Quito and Rio Bamba, his movements being greatly hindered by the disturbed state of the country at that time. Details of these journeys may be found in his letters to Sir William Hooker, which the latter published in various volumes of the 'London Journal of Botany.'

In 1860 he was associated with Mr. C. Markham in the collection of seeds of *Cinchona succirubra* for cultivation in the British Colonies, a task which he successfully accomplished though suffering from rheumatic fever; then his broken health enjoined his removal to a more congenial climate, and he went to the plain of Guayaquil in 1861; and in the following year, on the coast at Chanduy, the advent of an exceptionally rainy season, after a drought of 15 years, enabled him to make a small collection of the peculiar flora which sprang up under these circumstances in the desert. His savings were all lost by the fraud of a bank clerk, but on his return home in 1864 he was awarded a small pension by the Government. He settled at Coneysthorpe near Castle Howard, in Yorkshire, and, crippled as he was by his delicate health, he succeeded in working up a large amount of his hepatic collections during the last twenty years of his life, although he had to recline on his couch while at work. An appreciative account of these later achievements will be found in an article by Mr. Gepp in the 'Journal of Botany' for February last; and a record of the geographical side of the explorer is in the 'Geographical Journal' for March last. His very last paper was read before this Society, and is now in the hands of the printer: it was on the hepatics of St. Vincent and Dominica. He died at Coneysthorpe on December 28th, 1894, and was buried in that place on the last day of the year.

Richard Spruce's connection with this Society was of recent date, but the fault was not on the part of the Society. Several years before, the Council proposed to nominate him an Associate, but on sounding him he returned a curt refusal, which, though pardonable in a chronic invalid, was couched in such terms as made it impossible to persevere in the intention. Only last year he wrote to a friend regretting his hasty answer of former years, and this coming to the knowledge of the Council, steps were taken to bring his name forward at the next vacancy, which was done, and his name was duly added to the roll of our distinguished botanists.

John Jenner Weir was born at Lewes, Sussex, on August 9th, 1822, and he was educated chiefly at Dr. Rodgers' school in Camberwell. Destined for the Civil Service, he entered the Custom House at the age of 17, and, advancing step by step in the department, he was appointed in 1874 to the high post of Accountant and Controller General, which he held until his retirement in 1885. From boyhood he was an ardent student of natural history, and his first published writing on the subject appeared in the 'Zoologist' for 1845. Entomology may be said to have been his first love, and several of the discoveries he made among the Micro-lepidoptera have been named after him. In his later years he devoted much attention to the formation of an extensive general collection of Butterflies, with special regard to those groups in which mimicry and protective resemblance may be observed to best advantage, a subject upon which he was

an enthusiastic worker. His knowledge of Ornithology, Botany, and practical Horticulture was considerable, and his large fund of information on almost every branch of natural history made him a sound adviser and a valued guide to all who had the privilege of his acquaintance.

Elected a Fellow of the Entomological Society in 1845, he was one of the most constant attendants at the meetings up to the time of his death, and was often on its Council. He was elected a Fellow of this Society in 1865, of the Zoological in 1876, and had served on the Council of both. He was also for some time on the Council of the Ray Society, and had been President of more than one local natural history society. Some years ago he had a serious attack of heart disease, from which, however, he rallied in a remarkable manner. From this cause he died very suddenly at his residence at Beckenham, Kent, on March 23rd, 1894.

June 7th, 1894.

Mr. Charles Baron Clarke, F.R.S., President, in the Chair.

The Minutes of the Anniversary Meeting were read and confirmed.

Messrs. William Edward Baily, Frederick William Hildyard, and Amadeus Zietz were elected Fellows.

The President announced that a Bust of Charles Waterton, the Yorkshire Naturalist and author of 'Wanderings in South America,' had been presented to the Society by the trustees of the late Mrs. Pitt Byrne (*née* Busk). This bust was executed in 1865 (the year in which he died at the age of 83) by the late Mr. Waterhouse Hawkins. The bust had been accepted by the Council on behalf of the Society.

The President nominated the following gentlemen to be Vice-Presidents for the ensuing year, viz.:—Mr. John Gilbert Baker, Mr. William Carruthers, Mr. Frank Crisp, and Prof. Charles Stewart.

Dr. John Lowe communicated the results of observations made by him in Madeira and Teneriffe on the habit of certain insectivorous small birds belonging to the genera *Sylvia*, *Phylloscopus*, and *Parus* (of which specimens were exhibited) of puncturing the calyces of flowers for the purpose of attracting insects on which they feed. A discussion followed, in which the President, the Rev. G. Henslow, and others took part.

Mr. Carruthers exhibited a series of photographs of the celebrated Cowthorpe Oak in Yorkshire, taken at long intervals, commencing with a reproduction of Dr. Hunter's engraving of 1776, and made remarks upon the rate of growth and decay and probable duration of life in this tree.

Mr. Raymond Dowling exhibited and made remarks upon a dwarf glaucous Pine and some variously shaped Trapa fruits from Japan.

Mr. Thomas Christy exhibited specimens of two species of Polygonum, *P. sacchalinense* and *P. cuspidatum*, of value for forage, and pointed out that the roots of the mature plants when cut are in the former species of a whitish colour, and in the latter of a bright yellow, enabling the two to be readily distinguished in a state of rest.

The following paper was read :—

"On Stipules, their Forms and Functions.—Part II." By Sir John Lubbock, Bart., M.P., F.R.S., F.L.S.

June 21st, 1894.

Mr. Charles Baron Clarke, F.R.S., President, in the Chair.

The Minutes of the last Meeting were read and confirmed.

Mr. Willoughby Gardner was elected a Fellow.

Mr. George Brebner exhibited and made remarks upon specimens of *Scaphospora speciosa*, Kjellm., describing, with the aid of lantern slides, the structure and mode of fructification in this and other allied algæ.

Mr. J. R. Jackson exhibited the cone of a Stone Pine, *Pinus Pinea*, Linn., which had been picked up by the Comte de Paris in the Coté del Rey, Seville, and which had sprouted and continued to grow for a month afterwards. This peculiarity, which had been often noticed in the Larch, was said to be of rare occurrence in the Pine.

Mr. Thomas Christy exhibited and made remarks upon a small-berried Coffee-plant from Inhambane, East Africa, somewhat similar to a variety from Sierra Leone and other parts of the West Coast. It was said to be valued for its fine aromatic bitter taste, which made it useful for flavouring beans and other materials ground up and sold as coffee.

The following papers were read :—

1. "On some Plants from East Equatorial Africa collected by J. W. Gregory and the Rev. W. E. Taylor." By A. B. Rendle, F.L.S.

2. "On Tabulation Areas." By Charles Baron Clarke, Pres. Linn. Soc.

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